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RELAY, ELECTROMAGNETIC, NON-LATCHING, 28VDC, 25A, 3PDT

ESCC Detail Specification No. 3601/009

Issue 5	June 2021



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DOCUMENTATION CHANGE NOTICE

(Refer to https://escies.org for ESCC DCR content)

DCR No.	CHANGE DESCRIPTION
1424	Specification updated to incorporate changes per DCR.



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1 <u>GENERAL</u>

1.1 <u>SCOPE</u>

This specification details the ratings, physical and electrical characteristics, and test and inspection data for the component type variants and/or the range of components specified below. It supplements the requirements of, and shall be read in conjunction with, the ESCC Generic Specification listed under Applicable Documents.

1.2 <u>APPLICABLE DOCUMENTS</u>

The following documents form part of this specification and shall be read in conjunction with it:

(a) ESCC Generic Specification No. 3601.

1.3 TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS

For the purpose of this specification, the terms, definitions, abbreviations, symbols and units specified in ESCC Basic Specification No. 21300 shall apply.

1.4 THE ESCC COMPONENT NUMBER AND COMPONENT TYPE VARIANTS

1.4.1 <u>The ESCC Component Number</u> The ESCC Component Number shall be constituted as follows:

Example: 36010090228V

- Detail Specification Reference: 3601009
- Component Type Variant Number: 02 (as required)
- Characteristic code: Rated Coil Voltage (28Vdc): 28V (as required)

1.4.1.1 Characteristics and/or Ratings Codes

Characteristics and/or ratings to be codified as part of the ESCC Component Number shall be as follows:

(a) Rated Coil Voltage expressed by means of the following codes:

Rated Coil Voltage (Vdc)	Code
28	28V
12	12V

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1.4.2 Component Type Variants and Range of Components

The component type variants and range of components applicable to this specification are as follows:

Variant Number	Case and Terminal Description (Note 1)	Rated Coil Voltage (Vdc)	Weight max (g)
02	Raised Vertical Flange Mount Solder Hook Terminals	28, 12	82
03	Raised Vertical Flange Mount Solder Pin Terminals	28, 12	82
04	Horizontal Flange Mount Solder Hook Terminals	28, 12	82
07	Horizontal Flange Mount Solder Pin Terminals	28, 12	82

NOTES:

1. See Para. 1.6.

1.5 MAXIMUM RATINGS

The maximum ratings shall not be exceeded at any time during use or storage.

Maximum ratings shall only be exceeded during testing to the extent specified in this specification and when stipulated in Test Methods and Procedures of the ESCC Generic Specification.

Characteristics	Symbols	Maximum Ratings	Units	Remarks
Coil Voltage Range	V _{CR}	26.5 to 32 11 to 14.5	Vdc	Rated Coil Voltage: 28Vdc Rated Coil Voltage: 12Vdc
Rated Resistive Load Contact Current	I _{CR}	25	А	28Vdc resistive Note 1
Rated Inductive Load Contact Current	Icl	12	A	28Vdc inductive Note 1
Overload Current	IOVERLOAD	50	А	28Vdc resistive
Operating Temperature Range	T _{op}	-65 to +125	°C	Tamb
Storage Temperature Range	T _{stg}	-65 to +125	°C	T _{amb}
Soldering Temperature	T _{sol}	+260	°C	Note 2

NOTES:

1. Relays should not be used in change-over mode where the potential difference between stationary contacts is greater than 10V and the switched current is greater than 100mA.

2. Duration 10 seconds maximum at a distance not less than 3mm from the device body. The same terminal shall not be resoldered until 3 minutes have elapsed.

1.6 PHYSICAL DIMENSIONS AND TERMINAL IDENTIFICATION

1.6.1 Raised Vertical Flange Mount and Solder Hook Terminals (Variant 02)

H GG
FF LKJIT - HH
ØP - Colour reference bead

	<u> </u>			_
cc ↓			BB	в
t	ØT –		<u>a</u> t †	R S
(11	nner dia.) / ØU (inner	dia.)		

Symbols		nsions m)	Symbols	Dimensions (mm)				Symbols		nsions m)
	Min	Max		Min	Max			Min	Max	
Α	-	26	L	15	15.4		BB	3.8	4.2	
В	-	25.7	ØN	2.3	2.45		CC	0.9	1.1	
С	-	26	ØP	0.95	1.1		DD	31.15	32.15	
D	15.8	16.2	Q	7.1	8.1		EE	40	41	
E	10.8	11.2	R	9	10		FF	-	24	
F	5.7	6.1	S	15.4	16.4		GG	3.55	4.05	
Н	3.7	3.9	ØT	2.3	2.45		HH	15.65	16.15	
J	7.4	7.8	ØU	0.95	1.1					
K	11.2	11.6	AA	-	43.6					

NOTES:

Terminal identification is specified by reference to the colour reference bead and the terminals' 1. configuration. See Para. 1.7.

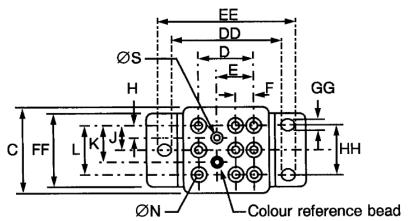


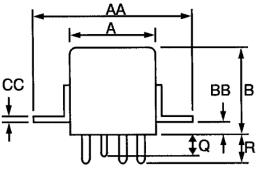
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1.6.2 <u>Raised Vertical Flange Mount and Solder Pin Terminals (Variant 03)</u>





Symbols	Dimensions (mm)		Symbols	Dimensions (mm)						Symbols		nsions m)
	Min	Max		Min	Max			Min	Max			
Α	-	26	K	11.2	11.6		CC	0.9	1.1			
В	-	25.7	L	15	15.4		DD	31.15	32.15			
С	-	26	ØN	2.3	2.41		EE	40	41			
D	15.8	16.2	Q	6.1	6.6		FF	-	24			
E	10.8	11.2	R	6.6	7.1		GG	3.55	4.05			
F	5.7	6.1	ØS	1.55	1.63		HH	15.65	16.15			
Н	3.7	3.9	AA	-	43.6							
J	7.4	7.8	BB	3.8	4.2							

NOTES:

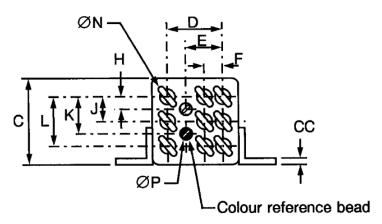
1. Terminal identification is specified by reference to the colour reference bead and the terminals' configuration. See Para. 1.7.

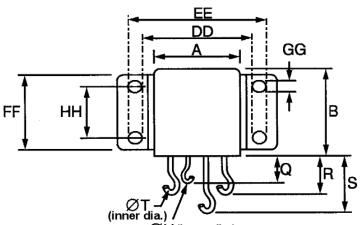


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1.6.3 <u>Horizontal Flange Mount and Solder Hook Terminals (Variant 04)</u>





ØU (inner dia.)

Symbols	Dimensions (mm)		Symbols	Symbols Dimensions (mm)		-		Symbols	Dimer (m	nsions m)
	Min	Max		Min	Max			Min	Max	
А	-	26	K	11.2	11.6		ØU	0.95	1.1	
В	-	25.7	L	15	15.4		AA	-	43.6	
С	-	26	ØN	2.3	2.45		CC	0.9	1.1	
D	15.8	16.2	ØP	0.95	1.1		DD	31.15	32.15	
E	10.8	11.2	Q	7.1	8.1		EE	40	41	
F	5.7	6.1	R	9	10		FF	-	24	
Н	3.7	3.9	S	15.4	16.4		GG	3.55	4.05	
J	7.4	7.8	ØT	2.3	2.45		HH	15.65	16.15	

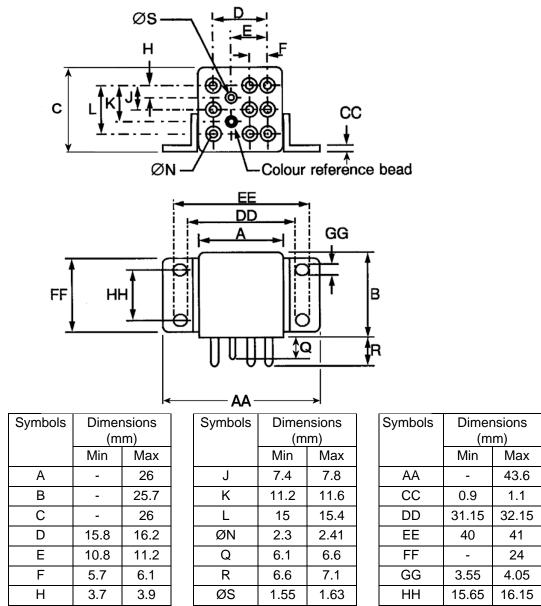
NOTES:

1. Terminal identification is specified by reference to the colour reference bead and the terminals' configuration. See Para. 1.7.



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1.6.4 <u>Horizontal Flange Mount and Solder Pin Terminals (Variant 07)</u>

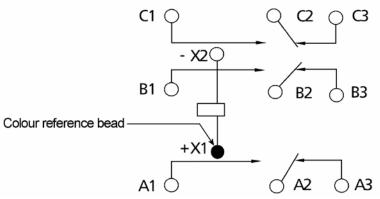


NOTES:

1. Terminal identification is specified by reference to the colour reference bead and the terminals' configuration. See Para. 1.7.



1.7 FUNCTIONAL DIAGRAM



NOTES:

- 1. As viewed from the terminal side with coil de-energised.
- 2. Individual terminal designations are for reference purposes only.

1.8 MATERIALS AND FINISHES

1.8.1 <u>Case</u>

Copper nickel, hermetically sealed. Tin-lead alloy plating may be used.

1.8.2 <u>Terminals</u>

The lead material and finish shall by type H3, H4 or H19 in accordance with the requirements of ESCC Basic Specification No. 23500.

2 <u>REQUIREMENTS</u>

2.1 <u>GENERAL</u>

The complete requirements for procurement of the components specified herein are as stated in this specification and the ESCC Generic Specification. Permitted deviations from the Generic Specification, applicable to this specification only, are listed below.

Permitted deviations from the Generic Specification and this Detail Specification, formally agreed with specific Manufacturers on the basis that the alternative requirements are equivalent to the ESCC requirement and do not affect the component's reliability, are listed in the appendices attached to this specification.

2.1.1 <u>Deviations from the Generic Specification</u>

2.1.1.1 Deviations from Qualification and Periodic Tests - Chart F4

- (a) Inductive Life: Number of Cycles of Operation shall be 10000 minimum.
- (b) Resistive Life: Number of Cycles of Operation shall be 50000 minimum.



2.2 <u>MARKING</u>

The marking shall be in accordance with the requirements of ESCC Basic Specification No. 21700 and as follows.

The information to be marked on the component shall be:

- (a) The ESCC qualified components symbol (for ESCC qualified components only).
- (b) The ESCC Component Number (see Para. 1.4.1).
- (c) Traceability information.

2.3 TERMINAL STRENGTH

The terminals of all Variants are defined as rigid.

The test conditions for Terminal Strength, tested as specified in the ESCC Generic Specification, shall be as follows:

- (a) Pull Test : Applied Force:
 - 50N for > 1.2mm diameter terminals
 - 25N for < 1.2mm diameter terminals

2.4 <u>ELECTRICAL MEASUREMENTS AT ROOM, HIGH AND LOW TEMPERATURES</u> Electrical measurements shall be performed at room, high and low temperatures.

2.4.1 Room Temperature Electrical Measurements

The measurements shall be performed at $T_{amb} = +22 \pm 3^{\circ}C$.

Characteristics	Symbols	Test Method and Conditions	Rated Coil	Lin	Units	
		Conditions	Voltage (Vdc)	Min	Max	
Pick-up Voltage	Uc	ESCC No. 3601	28 12	-	13.5 6.5	V
Drop-out Voltage	UD	ESCC No. 3601	28 12	2.3 0.75	5.5 3.3	V
Operate Time	t⊨	ESCC No. 3601	All	-	15	ms
Release Time	t⊳	ESCC No. 3601	All	-	15	ms
Bounce Time	tΒ	ESCC No. 3601	All	-	1	ms
Insulation Resistance	Rı	ESCC No. 3601 V _{TEST} = 500Vdc	All	100	-	MΩ
Voltage Proof (Test Voltage)	VP	ESCC No. 3601 Maximum Leakage	All	1250	-	Vrms
(Test Voltage)		Current I _{LVP} = 1mA		1000 (Note 1)	-	
Voltage Proof Leakage Current	ILVP	ESCC No. 3601 Note 2	All	-	1	mA
Contact Voltage Drop	V _D	ESCC No. 3601 100mA ≤ I _{TEST} ≤ 25A	All	-	0.006 x I _{TEST}	V

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Characteristics	Symbols	Test Method and Conditions	Rated Coil Voltage	Limits		Units
		Conditions	(Vdc)	Min	Max	
Coil Resistance	R _B	ESCC No. 3601				Ω
			28	260	320	
			12	63	77	

NOTES:

- 1. Between coil and case, between open contacts
- 2. Measured during Voltage Proof test.

2.4.2 High and Low Temperatures Electrical Measurements

Characteristics	Symbols	Symbols Test Method and Conditions	Rated Coil	Limits		Units
		Conditions	Voltage (Vdc)	Min	Max	
Pick-up Voltage	Uc	ESCC No. 3601 T _{amb} = +125 (+0 -5)°C and -65 (+5 -0)°C	28 12	-	19.8 9.9	V
Drop-out Voltage	U⊳	ESCC No. 3601 T _{amb} = +125 (+0 -5)°C and -65 (+5 -0)°C	28 12	1.5 0.5	7 4.5	V
Operate Time	t⊨	ESCC No. 3601 T _{amb} = +125 (+0 -5)°C and -65 (+5 -0)°C	All	-	15	ms
Release Time	t⊳	ESCC No. 3601 T _{amb} = +125 (+0 -5)°C and -65 (+5 -0)°C	All	-	15	ms
Bounce Time	tв	ESCC No. 3601 T _{amb} = +125 (+0 -5)°C and -65 (+5 -0)°C	All	-	1	ms
Insulation Resistance	Rı	ESCC No. 3601 T _{amb} = +125 (+0 -5)°C V _{TEST} = 500Vdc	All	50	-	MΩ
Contact Voltage Drop	VD	ESCC No. 3601 T _{amb} = +125 (+0 -5)°C and -65 (+5 -0)°C 100mA ≤ I _{TEST} ≤ 25A	All	-	0.006 x Ітеят	V



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2.5 PARAMETER DRIFT VALUES

Parameter Drift Values shall be measured as specified in the ESCC Generic Specification.

Unless otherwise specified, the measurements shall be performed at T_{amb} = +22 ±3°C.

The test methods and test conditions shall be as per the corresponding test defined in Para. 2.4.1 Room Temperature Electrical Measurements.

The corresponding absolute limit values for each characteristic shall not be exceeded.

Characteristics	Symbols	Limits			Units
		Drift Value	Absolute		
		Δ	Min	Max	
Pick-up Voltage	Uc	Note 1	Note 2	Note 2	V
Drop-out Voltage	UD	Note 1	Note 2	Note 2	V

NOTES:

- 1. Drift Value (Δ) limits are not specified. Drift Values shall be recorded for information purposes only.
- 2. The limit specified in Para. 2.4.1 shall apply.

2.6 INTERMEDIATE AND END-POINT ELECTRICAL MEASUREMENTS

Unless otherwise specified, the measurements shall be performed at T_{amb} = +22 ±3°C.

Unless otherwise specified the test methods and test conditions shall be as per the corresponding test defined in Para. 2.4.1 Room Temperature Electrical Measurements.

Test Reference per	Characteristics	Symbols	Limits		Units
ESCC No. 3601	(Note 1)		Min	Max	
Thermal Shock	During 5th Cycle				
	Pick-up Voltage	Uc	Note 2		V
	Drop-out Voltage	UD	Note 2		V
	Operate Time	t⊨	Note 2		ms
	Release Time	t⊳	Note 2		ms
	Final Measurements				
	Voltage Proof	VP	Note 3		Vrms
	Voltage Proof Leakage Current	I _{LVP}	Not	Note 3	



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ESCC No. 3601 (Note 1) Min Max Low Level Sine Vibration Final Measurements Pick-up Voltage Uc Note 3 V Pick-up Voltage Drift ΔUc/Uc Note 1 % Drop-out Voltage Drift ΔUc/Uc Note 3 V High Level Sine Vibration Final Measurements V Note 3 V Pick-up Voltage Uc Note 3 V Note 3 V High Level Sine Vibration Final Measurements V Note 3 V Pick-up Voltage Drift ΔUc/Uc Note 1 % Note 3 V Drop-out Voltage Drift ΔUc/Uc Note 3 V Note 3 V Mechanical Shock Final Measurements Contact Voltage Drop Vo Note 3 V Pick-up Voltage Drift ΔUc/Uc Note 3 V Note 3 V Mechanical Shock Final Measurements Contact Voltage Drift ΔUc/Uc Note 3 V Voltage Proof VP Note 3 V Note 3	Test Reference per	Characteristics	Symbols	Lin	nits	Units
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Insulation ResistanceRiNote 3ΜΩContact Voltage DropVDNote 3mVPick-up VoltageUcNote 3VDrop-out VoltageUDNote 3V		Final Measurements				
Pick-up VoltageUcNote 3VDrop-out VoltageUDNote 3V	Soldering Heat	Insulation Resistance	Ri	No	te 3	MΩ
Drop-out Voltage U _D Note 3 V		Contact Voltage Drop	VD	No	te 3	mV
		Pick-up Voltage	Uc	No	te 3	V
Coil ResistanceRBNote 3Ω		Drop-out Voltage	UD	No	te 3	V
		Coil Resistance	R _B	No	te 3	Ω



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Test Reference per	Characteristics	Symbols	Lin	Units	
ESCC No. 3601	(Note 1)		Min	Max	
Inductive Life	During Monitoring			•	
	Contact Voltage Drop	VD	-	2.8	V
	Final Measurements				
	Contact Voltage Drop	VD	-	0.007 х І _{теsт}	V
	Insulation Resistance	Rı	50	-	MΩ
	Voltage Proof	VP	1000	-	Vrms
	Voltage Proof Leakage Current	I _{LVP}	No	te 3	mA
	Pick-up Voltage	Uc	Note 3		V
	Pick-up Voltage Drift	∆Uc/Uc	Note 1		%
	Drop-out Voltage	UD	Note 3		V
	Drop-out Voltage Drift	$\Delta U_D/U_D$	Note 1		%
	Operate Time	t _E	Note 3		ms
	Release Time	t⊳	Note 3		ms
	Bounce Time	t _B	No	te 3	ms
	Coil Resistance	Rв	No	te 3	Ω
Resistive Life	During Monitoring				
	Contact Voltage Drop	VD	-	2.8	V
	Final Measurements			I	
	Contact Voltage Drop	VD	-	0.007 х І _{теsт}	V
	Insulation Resistance	Ri	50	-	MΩ
	Voltage Proof	VP	1000	-	Vrms
	Voltage Proof Leakage Current	I _{LVP}	No	te 3	mA

Uc

∆Uc/Uc

 U_{D}

 $\Delta U_D/U_D$

 t_{E}

tD

tΒ

Rв

Note 3

Note 1

Note 3

Note 1

Note 3

Note 3

Note 3

Note 3

V

%

V

%

ms

ms

ms

Ω

Pick-up Voltage

Drop-out Voltage

Operate Time

Release Time

Bounce Time

Coil Resistance

Pick-up Voltage Drift

Drop-out Voltage Drift



Test Reference per ESCC No. 3601

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No. 3601/009	

Characteristics	Symbols	Limits		Units
(Note 1)		Min	Max	
Step 1 of each Cycle				
Voltage Drop	VD	Note 3		V
sistance	R _Β	Note 3		Ω
Step 3 of 1st Cycle				
Voltage Drop	VD	Note 2		V

Coil Life	During Step 1 of each Cycle				
	Contact Voltage Drop	VD	Not	e 3	V
	Coil Resistance	R _Β	Not	e 3	Ω
	During Step 3 of 1st Cycle				
	Contact Voltage Drop	VD	Not	e 2	V
	Operate Time	t⊨	Not	e 2	ms
	Release Time	t _D	Not	e 2	ms
	During Steps 4 & 5 of 4th Cycle				
	Pick-up Voltage	Uc	Not	e 2	V
	Drop-out Voltage	UD	Not	e 2	V
	Final Measurements				
	Voltage Proof	VP	Not	e 3	Vrms
	Voltage Proof Leakage Current	ILVP	Not	e 3	mA
	Insulation Resistance	Rı	Not	e 3	MΩ
	Contact Voltage Drop	VD	Not	e 3	V
	Coil Resistance	Rв	Not	e 3	Ω
	Operate Time	t⊨	Not	e 3	ms
	Release Time	t⊳	Not	ie 3	ms
	Bounce Time	tΒ	Not	ie 3	ms



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Test Reference per	Characteristics	Symbols	Limits		Units
ESCC No. 3601	(Note 1)		Min	Max	
Intermediate Current	During Monitoring				
	Contact Voltage Drop:	VD	-	200	mV
	Final Measurements				
	Insulation Resistance	Rı	50	-	MΩ
	Voltage Proof	VP	1000	-	Vrms
	Voltage Proof Leakage Current	ILVP	No	te 3	mA
	Pick-up Voltage	Uc	No	te 3	V
	Pick-up Voltage Drift	∆Uc/Uc	No	te 1	%
	Drop-out Voltage	UD	No	te 3	V
	Drop-out Voltage Drift	$\Delta U_D/U_D$	No	te 1	%
	Operate Time	t⊨	Note 3		ms
	Release Time	tD	No	te 3	ms
	Bounce Time	tΒ	No	te 3	ms
	Coil Resistance	Rв	No	te 3	Ω
	Contact Voltage Drop	VD	-	0.007 x I _{TEST}	V
Mechanical Life	Final Measurements				
	Contact Voltage Drop	VD	-	0.007 х І _{теsт}	V
	Pick-up Voltage	Uc	No	te 3	V
	Pick-up Voltage Drift	$\Delta U_{c}/U_{c}$	No	te 1	%
	Drop-out Voltage	UD	No	te 3	V
	Drop-out Voltage Drift	$\Delta U_D/U_D$	No	te 1	%
	Operate Time	t⊨	No	te 3	ms
	Release Time	t _D	No	te 3	ms
	Bounce Time	tΒ	No	te 3	ms
	Coil Resistance	Rв	No	te 3	Ω



Test Reference per	Characteristics	Symbols	Lin	Limits	
ESCC No. 3601	(Note 1)		Min	Max	
Overload	During Monitoring				
	Contact Voltage Drop	VD	-	2.8	V
	Final Measurements			I	
	Contact Voltage Drop	VD	-	0.007 х І _{теsт}	V
	Insulation Resistance	Rı	50	-	MΩ
	Voltage Proof	VP	1000	-	Vrms
	Voltage Proof Leakage Current	I _{LVP}	No	te 3	mA
	Pick-up Voltage	Uc	Note 3		V
	Pick-up Voltage Drift	∆Uc/Uc	Note 1		%
	Drop-out Voltage	UD	No	te 3	V
	Drop-out Voltage Drift	$\Delta U_D/U_D$	No	te 1	%
	Operate Time	t _E	No	te 3	ms
	Release Time	t⊳	No	te 3	ms
	Bounce Time	t _B	No	te 3	ms
	Coil Resistance	Rв	Note 3		Ω

NOTES:

- 1. Parameter Drift shall be calculated referenced to the measurement immediately prior to the test in question. An additional initial measurement may be performed prior to the test in question if considered necessary. Drift limits are not specified. Drift Values shall be recorded for information purposes only.
- 2. The limits specified in Para. 2.4.2, as applicable to the same test temperature, shall apply.
- 3. The limits specified in Para. 2.4.1 shall apply.

2.7 <u>RUN-IN CONDITIONS</u>

The test conditions for Run-in, tested as specified in the ESCC Generic Specification, shall be as follows:

(a) Test Temperature: +22 ±3°C.

ESCC Detail Specification



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<u>APPENDIX A</u>

AGREED DEVIATIONS FOR LEACH INTERNATIONAL EUROPE (F)

ITEMS AFFECTED	DESCRIPTION OF DEVIATIONS
Para. 1.8.2 Materials and Finishes: Terminals	Terminal material shall be Iron-Cobolt.
Para. 2.1.1.1 Deviations from Qualification and Periodic Tests - Chart F4	High Level Sine Vibration: Not Applicable
	High Level Mechanical Shock: Not Applicable
	Chart F4: Coil Life subgroup test sequence (under Endurance Subgroup 1):
	Coil Life and the subsequent tests shall only be performed for Qualification. They are not required for Periodic Testing except in the case of any significant change to the design.

ESCC Detail Specification



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APPENDIX B AGREED DEVIATIONS FOR REL STPI (F)

ITEMS AFFECTED	DESCRIPTION OF DEVIATIONS
Para. 2.1.1.1 Deviations from Qualification and Periodic Tests - Chart F4	High Level Sine Vibration: Not Applicable
	High Level Mechanical Shock: Not Applicable
	Chart F4: Coil Life subgroup test sequence (under Endurance Subgroup 1):
	Coil Life and the subsequent tests shall only be performed for Qualification. They are not required for Periodic Testing except in the case of any significant change to the design.