INSTALLATION INSTRUCTION
TIMERS

S1 ETS1 | S1 ETM1 | S1 ESD1 | ETS D1 | ETA D1 | ESR D1

INTRODUCTION

Thank you for selecting and purchasing Minilec make Electronic Time Delay Relay (TDR). The Following installation instructions would guide you in installing your TDR and making best use of it. These Relays are auxiliary relays and should be used in control circuit only.
S1 ETS, S1 ETM1 are fillk model of delay timer is second & minutes.
S1 ESD1 fleeck model of star, delta timer.

ESDD1 It is Suitable for STAR Time Delay within the time range of 0.75 sec to 60 sec in 2 different Time Ranges.

The Star time setting can be done by setting DIP switch no.1 which is provided at the front of the unit to Select The Star Time Range (Tmax) and potentiometer provided on front plate.

The Star to Delta Transfer Delay Time Setting
This can be done by setting DIP switch no.2 provided at the front of the unit.

DIP switch setting for STAR time range (Tmax) selection	
T max	DIP Switch no. 1
7.5 sec	ON
60 sec	OFF

DIP switch setting for Star to Delta transfer delay time	
Delay	DIP Switch no. 2
50 msec	ON
100 msec	OFF

ESDD1 : Set the STAR Timing Initially contacts 13-14 and 1-2 are in NO state. After switching ON the supply, the STAR time begins and STAR contact 13,14 shorts instantly till the set STAR time elapses Contacts 1-2 are still in NO. state (STAR condition)
After completion of STAR time Star contacts 13 & 14 become again NO For set Star to Delta transfer time delay of 50 msec or 100 msec the Star contact 13-14 and Delta contact 1-2 are in NO state. At the end of STAR to DELTA transfer time delay, the DELTA relay energises. i.e. the O/P contact of DELTA at 1-2 closes and STAR contact at 13-14 is in NO state. This is the DELTA condition of the unit and ESDD1 remains in this condition till the Aux. supply voltage is applied.

ETSD1/ETAD1: Set the desired time by front potentiometer for ETSD1. For ETAD1, select the desired time range (Tmax) by setting DIP switch provided at the front of the unit and set desired time by front potentiometer. Before the Aux Supply voltage is switched ON, the 0/P relay contacts at 13 & 14 (for ETSD1 1CO model and ETAD1) and at 1 & 2 (for ETSD1 2CO model only) are in energised state (NO). After switching ON the supply, the timer starts counting the timing and when the set time delay elapses the 0/P contacts change their state from the original status (from NO to NC).

TIME SETTING:

ETSD1: It is suitable for ON time delay from 0.3 sec to 180 MIN. with different time models.

ETAD1: It is Suitable for ON time delays within the time range of 0.7 sec to 30 MIN in 4 different time ranges.
The time setting can be done by DIP switch settings which is provided at the front of the unit to select the time range (Tmax) and potentiometer provided on front plate.

DIP switch settings for time range (Tmax) selection		
T max	DIP Switch no	
	1	2
7 see	ON	OFF
30 sec	OFF	ON
4 MIN	OFF	OFF
30 MIN	ON	ON

TECHNICAL SPECIFICATION

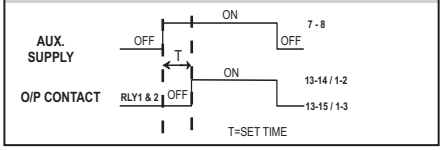
SR. NO.	PARAMETERS	S1 ETS1	S1 ETM1	S1 ESD1	ETS D1	ETAD1	ESD D1	ESR D1
1.	SYSTEM SUPPLY VOLTAGE	100-120 / 220-240 / 380-440 VAC ± 15% 12VDC / 24VDC / 24VAC (-10% + 15%)	100-120 / 220-240 / 380-440 VAC ± 15% 12VDC / 24VDC / 24VAC (-10% + 15%)	100-120 / 220-240 / 380-440 VAC ± 15% 12VDC / 24VDC (-10% + 15%)	12/24 VDC ± 10 % 24/110 /220/230/240/415 VAC ± 20 %	24 - 240VAC(-20%+10%) 24 - 240VDC(-20%+10%)	110/220/230/240/380/ 415/440 VAC -20% to+10%	12/24VDC±10% 110/220/230/240 VAC ±20%
2.	FREQUENCY	50 Hz / 60 Hz.	50 Hz / 60 Hz.	50 Hz / 60 Hz.	50 Hz/ 60 Hz. ± 3%	50 Hz/ 60 Hz. ± 3%	50 Hz/ 60 Hz. ± 3%	50Hz/60Hz.±3%
3.	POWER CONSUMPTION	28 VA Max.	28 VA Max.	28 VA Max.	3VA for AC models 3w for 24 VDC	5VA	15VA for 220/230/240 VAC 20VA for 380/415 VAC 25VA for 440 VAC	1V Afor12VDC 10VA for1 10V AC 3VA for 24VDC 15V Afor220/230/240V AC
4.	OUTPUT RELAY CONTACTS	1CO	1CO	1NO FOR STAR & 1NO FOR DELTA	2CO	1 CO	1 CO	Start Attempts:1ChangeOver AlarmOn:1ChangeOver
5.	OUTPUT CONTACT RATING	5 Amp, 240VAC [RESISTIVE]	5 Amp, 240VAC [RESISTIVE]	5 Amp, 240VAC [RESISTIVE]	5 Amp @ 240VAC [Resistive]	5 Amp @ 240VAC [Resistive]	5 Amp @ 240VAC [Resistive]	5 Amp,240V AC[Resistive]
6.	LIFE EXPECTANCY	0.5 X 10^6 OPERATIONS	0.5 X 10^6 OPERATIONS	0.5 X 10^6 OPERATIONS	0.5 X 10^5 operations at 100% rating	0.5 X 10^5 operations at 100% rating	0.5 X 10^5 operations at 100% rating	Mechanical-1X10^7 Electrical-0.5X10^7@100%Ratings
7.	SET ACCURACY	± 5% OF FULL SCALE	± 5% OF FULL SCALE	± 5% OF FULL SCALE	± 5 %(for seconds and minutes range). ± 2 %(for HRS range)	10% max. w.r.t. full scale	10% max. w.r.t. full scale	±3%max.w .t.fullscale.
8.	REPEAT ACCURACY	LESS THAN ± 1% AT RATED AUX. SUPPLY AT 25°C A) For temp. variation of 25°C to 60°C : ±3% Max of set value B) For supply variation of 10% : ±3% Max of set value C) For frequency variation of 1% : ±2% Max of set value						
9.	TIME RANGES STAR TIME STAR TO DELTA TRANSFER TIME	0 - 10 Sec / 0 - 30 Sec / 0 - 60 Sec ---------- ----------	0 - 30 Min / 0 - 60 Min ---------- ----------	---------- 0.75 - 60 Sec 50 - 100 mSec	0.1 sec to 209 hrs 1 to 19 min,10 to 109 min,20 to 209 min, 1 to 19 hrs,10 to 109 hrs, 20 to 209 hrs.	0.7s to 30min in 4 diff. time ranges(Variable/Adjustable)	0.7s to 60 sec (Variable/Adj.) Selectable by DIP switch no.1 50 or 100 msec (K10 msec) Selectable by DIP switch no.2	1to10sec.(viapotentiometer) 2to20sec.(viapotentiometer) i.e.2,4,6,8....,20.(Instepsof2sec.)
10.	RESETTING	AT POWER ON, RESET TIME < 200 mSec	AT POWER ON, RESET TIME < 200 mSec	AT POWER ON, RESET TIME < 200 mSec	Power On 200 msec.(max.)	200 msec (Max.)	200 msec (Max.)	PowerOn
11.	INDICATIONS ● ON / ST ● RLY / DT	POWER ON RELAY ON	POWER ON RELAY ON	STAR RELAY ON DELTA RELAY ON	L1 : Power On L2 : Relay On (Delay elapsed.)	Power ON Delay Elapsed	Power ON Delay Elapsed	ST(Green):Start Time On AL(Red): Alarm On
13.	ENCLOSURE	17.5mm S1 SERIES - ABS / PC - ABS	17.5mm S1 SERIES - ABS / PC - ABS	17.5mm S1 SERIES - ABS / PC - ABS	ABS	ABS	ABS	ABS
14.	DIMENSIONS (mm) ● OVERALL (L X W X D)	96 x 17.5 x 60	96 x 17.5 x 60	96 x 17.5 x 60	**Overall** : 76 X 30.5 X 117.5 **Mounting** : 68 center to center	76 X 30.5 X 120	76 X 30.5 X 120	76X30.5X117.5 68 center to center
15.	MOUNTING	35mm DIN RAIL AND WALL MOUNTING	35mm DIN RAIL AND WALL MOUNTING	35mm DIN RAIL AND WALL MOUNTING	35mm Rail Mounting & Panel Mounting	35mm RAIL Mounting	35mm RAIL Mounting	35mm RAIL Mounting
16.	OPERATING CONDITIONS	TEMPERATURE = -5 °C TO +60 °C HUMIDITY = UPTO 95% Rh.	TEMPERATURE = -5 °C TO +60 °C HUMIDITY = UPTO 95% Rh.	TEMPERATURE = -5 °C TO +60 °C HUMIDITY = UPTO 95% Rh.	5 °C To + 60 °C Up To 95 % Rh	Tempreature : 5 to 60C Humidity : Upto 95% RH	Tempreature : 5 to 60C	**Temperature :** -5°C To+60°C **Humidity** : Up To95%Rh
17.	WEIGHT (APPROX.)	90 gms.	90 gms.	120 gms.	175gms.	160	175	175gms.
18.	**Range Selection :**	By front pot			1. Range selector (10 positions) 2. Multiplier (1 to 10 positions) 3. Adder (0 to 9 count, 10 positions)	By front pot & Dip switches	By front pot	
19.	Operating Modes	ON DELAY	ON DELAY	STAR DELTA	ON DELAY	ON DELAY	ON DELAY	ENGINE START
20.	**NO. Of Start Attempts:**	NA	NA	NA	NA	NA	NA	1to10(viafrontpotentiometer)

WARRANTY - AGAINST ALL MANUFACTURING DEFECTS FOR 18 MONTHS FROM DATE OF SUPPLY OR 12 MONTHS FROM INSTALLATION WHICHEVER IS EARLIER

www.minilecgroup.com

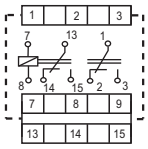
ETS D1

TIMING DIAGRAM



ELECTRICAL CONNECTION DIAGRAM

ETS D1



INDICATIONS
- L1 (Green) : POWER ON
- L2 (Red) : Delay Elapsed

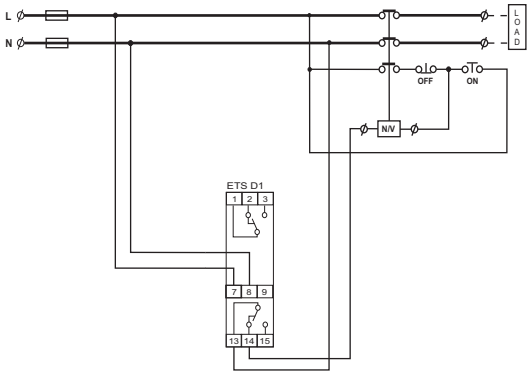
TERMINAL DETAILS

TERMINAL NO.	ETS D1
7 - 8	AUX. SUPPLY (AS MARKED ON UNIT)
13 - 14 -15	C1 - NO1 - NC1
1 - 2 - 3	C2 - NO2 - NC 2
9	DUMMY

NOTES :
- AUX. SUPPLY TO BE CONNECTED AS MENTIONED ON THE UNIT.
- RELAY CONTACTS SHOWN FOR DELAY ELAPSED CONDITION.

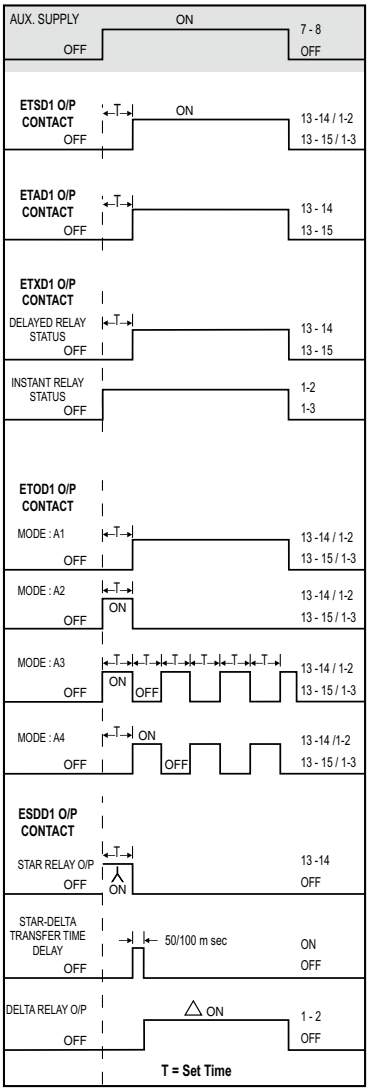
ELECTRICAL CONNECTION IN POWER AND CONTROL WIRING

ETS D1

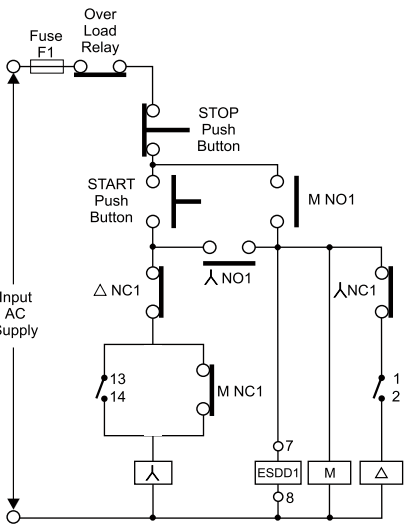


NOTE:
RELAY CONTACTS SHOWN FOR DELAY ELAPSED CONDITION.

TIMING CYCLE

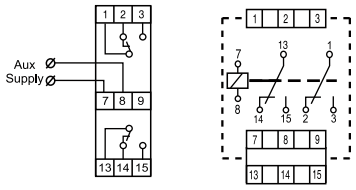


TYPICAL APPLICATION DIAGRAM FOR STAR-DELTA STARTER ESDD1



⅄, M and △ are STAR, MAINS and DELTA contactors respectively with operating voltages same as Aux.supply of ESDD1

ELECTRICAL CONTROL WIRING AND CONNECTION DIAGRAM ETSD1 / ETOD1 / ETAD1

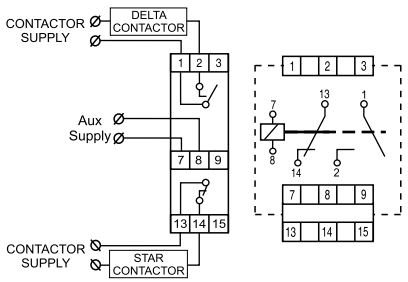


NOTE:
1. Relay Contacts shown for Delay Elapsed condition for ETSD1 and ETAD1
2. Relay Contacts shown for Relay In Healthy (Energised) Condition
3. Solid Part to be considered for ETAD1 and ETSD1(1CO) Model
4. Dotted part to be considered for ETOD1 and ETSD1(2CO) Model

INDICATIONS :
L1(GREEN) : POWER ON (For ETS D1)
L2(RED) : POWER ON (For ETO D1 & ETA D1)
L2(RED) : Delay Elapsed (For ETS D1 & ETA D1)
Relay is Healthy (Energised) condition (For ETO D1)

TERMINAL DETAILS :
7-8 : Aux. Supply as marked on Unit
13-14-15 : C1-NO1-NC1 (For ETA D1 & ETS D1 & ETO D1)
1-2-3 : C2-NO2-NC2 (For ETS D1(2CO) model & ETO D1)

ELECTRICAL CONTROL WIRING AND CONNECTION DIAGRAM ESDD1

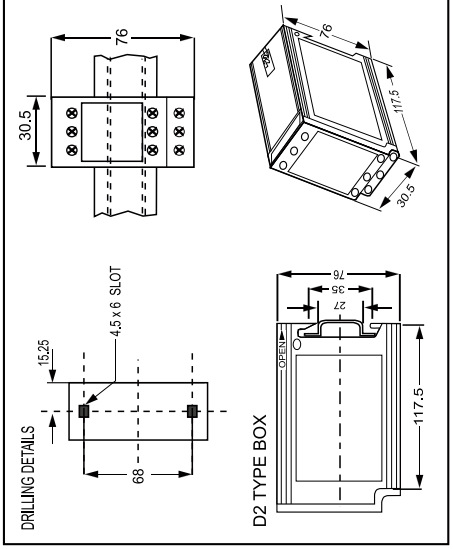


NOTE:
Relay Contacts shown for STAR condition i.e. when STAR relay is in HEALTHY (Energised) condition.

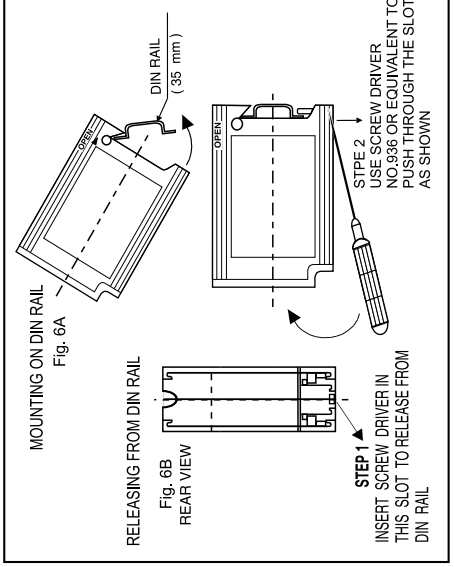
INDICATIONS :
L1(RED) : STAR Relay in Healthy (Energised) condition
L2(RED) : DELTA Relay in Healthy (Energised) condition

TERMINAL DETAILS :
7-8 : Aux. Supply as marked on Unit
13-14 : STAR relay output contact (NO)
1-2 : DELTA relay output contact (NO)

MOUNTING DIMENSIONS

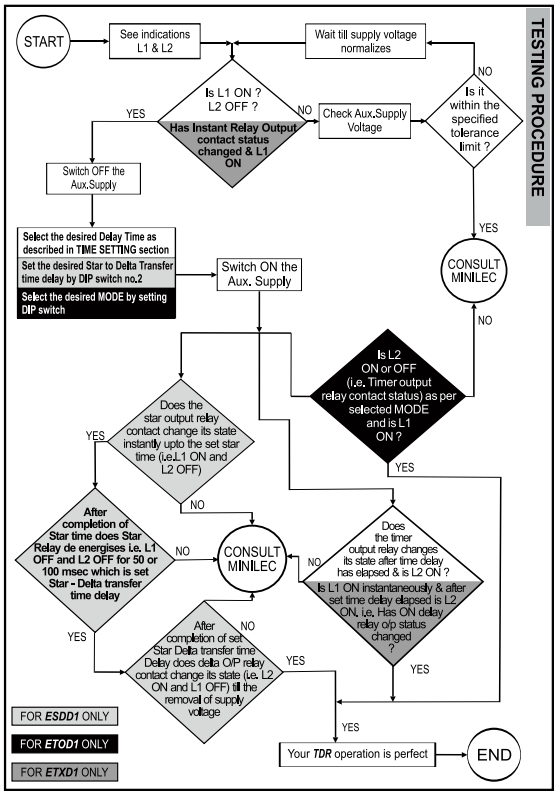


MOUNTING ON AND RELEASING FROM DIN RAIL



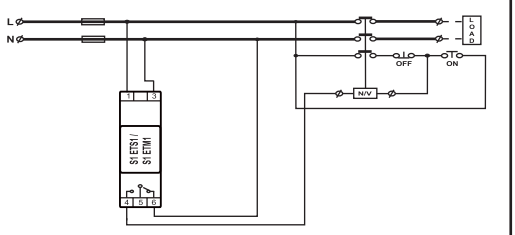
minilec®

ETSD1, ESDD1, ETAD1



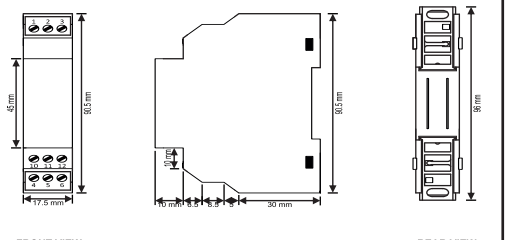
S1 ETS1, S1 ETM1, S1 ESD1

ELECTRICAL CONNECTION IN POWER & CONTROL WIRING FOR S1 ETS1, S1 ETM1



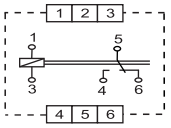
NOTE :- RELAY CONTACTS SHOWN FOR RELAY IN POWER OFF CONDITION.

ENCLOSURE DIMENSIONS



FRONT VIEW SIDE VIEW REAR VIEW

TERMINAL DETAILS: S1 ETS1, S1 ETM1

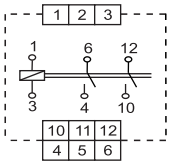


INDICATIONS:-
- ON (GREEN) - POWER ON
- RLY (RED) - DELAY ELAPSED

TERMINAL DETAILS	
1 - 3	AUX. SUPPLY (AS MARKED ON UNIT)
5 - 4 - 6	C - NO - NC

NOTES :-
- AUX. SUPPLY TO BE CONNECTED AS MENTIONED ON THE UNIT.
- RELAY CONTACTS SHOWN FOR POWER OFF CONDITION.
- FOR DC SUPPLY CONNECT +VE TO **1** AND -VE TO **3** TERMINAL

TERMINAL DETAILS: S1 ESD1

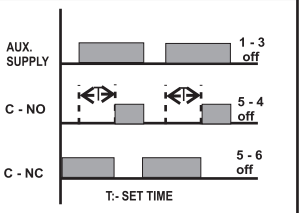


INDICATIONS:-
- ST (RED) - STAR RELAY ON
- DT (RED) - DELTA RELAY ON

TERMINAL DETAILS	
1 - 3	AUX. SUPPLY (AS MARKED ON UNIT)
4 - 6	NO - C (STAR)
10 -12	NO - C (DELTA)

NOTES :-
- AUX. SUPPLY TO BE CONNECTED AS MENTIONED ON THE UNIT.
- RELAY CONTACTS SHOWN FOR POWER OFF CONDITION.
- FOR DC SUPPLY CONNECT +VE TO **1** AND -VE TO **3** TERMINAL

TIMING DIAGRAM FOR S1 ETS1, S1 ETM1



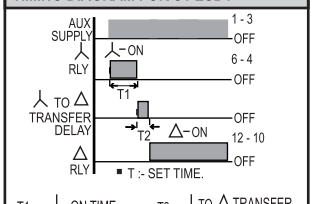
FUNCTIONING

Set the desired time by front potentiometer. Before Aux.supply voltage is switched on , output relay contacts are in de-energised state (NO).After switching ON the supply, the Timer starts counting the timing and when set time delay elapses the o/p contact change their state from original status. (From NO to NC)

RESETTING :-

Unit will reset only if Aux.supply of unit is removed from the point 1 and 3. And will restart its Set time Cycle when unit is switched ON.

TIMING DIAGRAM FOR S1 ESD1



T1 - ⅄ ON TIME

DIP S/W1	T1 MAX
ON	7.5 SEC
OFF	60 SEC

T2 - ⅄ TO △ TRANSFER DELAY

DIP S/W2	T2
ON	50 mSEC
OFF	100mSEC

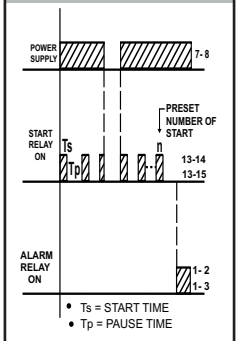
FUNCTIONING

Set the desired STAR time by DIP S/W 1 & front potentiometer & STAR to DELTA transfer time by DIP S/W 2.
Before Aux . Supply voltage is switched on both relay contacts are in de-energised state(NO).
After switching ON the supply , STAR relay is energised.After the set STAR time(T1),STAR relay is de energised.
For the set STAR to DELTA Transfer time (T2) both relays remain de-energised.At the end of T2, DELTA relay is energised & remain ON till power is ON.

RESETTING :-

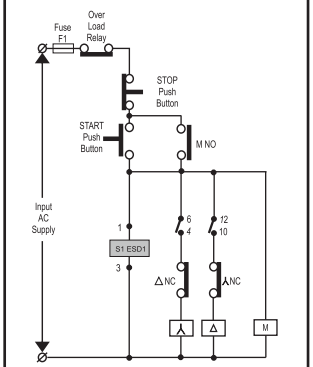
S1 ESD1 unit will reset only if Aux. supply of unit is removed from the point 1 & 3 and will restart its set time cycle when unit is switched ON.

TIMING DIAGRAM ESR D1



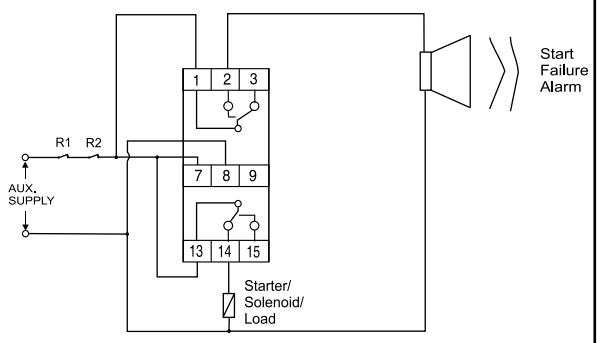
- Ts = START TIME
- Tp = PAUSE TIME

TYPICAL APPLICATION DIAGRAM FOR STAR-DELTA STARTER MODE FOR S1ESD1



⅄, M and △ are STAR, MAINS and DELTA contactors

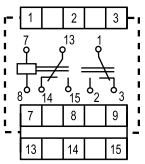
E LECTRICAL CONNECTION IN POWER AND CONTROL WIRING — ESR D1



TYPICAL WIRING :

- R1 - Mains failure contact, closes when starting is required.
- R2 - Start inhibit contact, Opens when engine set has started. (See "engine start up detection" in description of function.)
- Relay contacts shown for start relay in energized condition & alarm relay in de -energized condition .

ELECTRICAL CONNECTION DIAGRAM — ESR D1

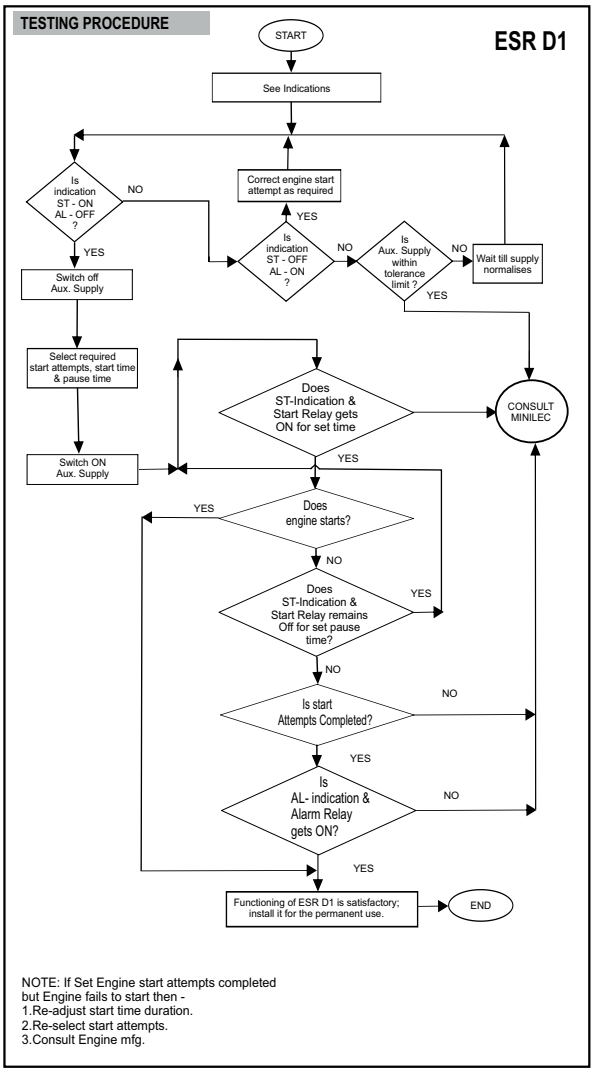


INDICATIONS
- ST :S TARTR ELAY
- AL : ALARMR ELAY

TERMINAL DETAILS

TERMINAL NO.	ESR D1
7 - 8	AUX. SUPPLY
13 - 14 -15	C1 - NO1 - N C1 (ST)
1 - 2 - 3	C2 - NO2 - N C2 (AL)
9	DUMMY

NOTES :
- AUX. SUPPLY TO BE CONNECTED AS MENTIONED ON THE UNIT.
- RELAY CONTACTS SHOWN FOR START RELAY IN ENERGIZED CONDITION & ALARM RELAY IN DE-ENERGIZED CONDITION.
- ALARM RELAY ENERGIZES IF THE START ATTEMPT GETS OVER



NOTE: If Set Engine start attempts completed but Engine fails to start then -
1.Re-adjust start time duration.
2.Re-select start attempts.
3.Consult Engine mfg.

FUNCTIONING

Select the start time, pause time and start attempts as per requirement. Terminal 7 & 8 is aux. Supply. Terminal 13-14-15 are start relay contact (C-NO-NC).
Terminal 1-2-3 alarm relay contacts(C-NO-NC).

STARTING : As Aux. supply is applied to the ESR D1**,** the ST relay energies for the set start time duration & provides cranking to the engine. If the aux. Supply to ESR D1 remain uninterrupted the first start attempt will be followed by a succession of starts with set pause time in between. If start attempt is successful, power supply to ESR D1 should be interrupted as soon as engine starts running, thus preventing further cranking.
Attempt = Start time + pause time.

START FAILURE ALARM : If the engine set fails to start after the set number of attempts, the starter sequence will be terminated and the start failure alarm relay will energized.

ENGINE START UP DETECTION : Successful start up can be detected by : 1) Monitoring the output frequency the engine set by using minilec S2FMR1 relay.
2)Monitoring the O/P voltage of the engine set by

COMPLIANCE TO STANDARDS

	TEST	IES STD
1.	EFT Test of Auxiliary Supply	61000-4-4
2.	Surge Test of Auxiliary Supply	61000-4-5
3.	Voltage Interruption, Variation & Dip Test	61000-4-11
4.	ESD Test (Contact Discharge)	61000-4-2
	ESD Teast (Air Discharge)	61000-4-2
5.	H.V. Test (Dielectric Test)	60255-5
6.	Insulation Resistance Test	60255-5
7.	Dry Heat Test	60068-2-2
8.	Damp Heat test (Steady State)	60068-2-30
9.	Damp Heat test (cyclic test)	60068-2-78

CAUTION

Ensure that TDR is -

- Not installed near any heat sources like burner, sunlight, electric arc etc.
- Not subjected to abnormal vibrations.
- Not subjected to direct heat, sunlight, rain, stormy wind and dust.
- Installed as near to starter/solenoid as possible.

Instructions for Screw Gun torque adjustment –

- Torque should be 1 Nm max.
- Max 2.5 sq. mm size wire can be used.

WEEE (Waste Electrical & Electronic Equipment) Regulations: After end of equipment life, recycle or disposal needs to ne done as per guidelines or handover it to Ewaste processing authorized agencies. For more details contact us.

WARRANTY - AGAINST ALL MANUFACTURING DEFECTS FOR 18 MONTHS FROM DATE OF SUPPLY OR 12 MONTHS FROM INSTALLATION WHICHEVER IS EARLIER

www.minilecgroup.com

Minilec (India) Pvt. Ltd.

Factory & Head Office: S. No. 1073/1-2-3, At Post: Pirangoot, Pune 412 111, India