



In A State Of Pleasant Surprise !

When we promise, **we deliver.**

We change with the changing markets;
we bring in changes that change the markets.

We respond to customer feedback.



No wonder our
customers remain in
a permanent state of
pleasant surprise!

We are Minilec

Starting operations in 1965 as a manufacturer of single phasing preventors (phase failure relays), Minilec is today a leading group involved in 100% indigenous production, marketing and export of reliable industrial electronic products for protection, control and monitoring.

Our insistence on quality has resulted in customer insistence for our products. Our continuous effort to introduce new features to enhance product performance, adapt new technology to bring in greater sophistication and evolve new products in anticipation of market needs gives our customers many reasons to remain in a permanent state of pleasant surprise !

Market leader in India
for protection relays,
monitoring relays and
alarm annunciators!

World's only company
manufacturing
a very wide range of
products in diverse
Protection, Control &
Monitoring areas !

minilec[®]

Expanding rapidly by
spreading our wings
globally and continuously
introducing new product
categories!

Index

THE MINILEC GROUP.....	03
SHAPING THE MARKETS.....	04
PROGRESS.....	05
QUALITY FOCUS.....	06
PRODUCTS.....	07
CUSTOMERS.....	08

PRODUCT DETAILS

Phase Failure Relays.....	09 - 14
Monitoring Relays.....	15 - 22
Motor / Pump Protection Relays.....	23 - 28
Electronic Timers.....	29 - 32
Liquid Level Controllers.....	33 - 36
Power Line Transducers.....	37 - 40
Automation Products.....	41 - 44
Alarm Annunciators.....	45 - 55
Other Products.....	56

Soft Starters.....	57 - 60
Agri Sector Product.....	61 - 63
Pune-the city of Minilec.....	64



THE MINILEC GROUP

ORGANISATION

The Minilec Group is a progress-oriented organisation incorporating four group companies. Group companies work on niche areas to ensure an 'activity focus'. The group is very well-knit and works together keeping the larger picture in sight.

Minilec (India) Pvt. Ltd. – A world-class manufacturer and exporter of microprocessor-based alarm annunciators, pre-programmed logic controllers, diesel level controllers, motor/pump protection relays, thermistor-based winding protection relays etc.

Minilec Protective Relays Pvt. Ltd. – Manufacturer of a variety of protection relays

Minilec Singapore Pte. Ltd. – The S-E Asia marketing wing

Shalaka Electronics Pvt. Ltd. – For export of Minilec products

NETWORK & CUSTOMER SUPPORT

Minilec has a strong sales and service network in the country which, along with an extensive dealer network, ensures reliable and prompt after-sales service. We also have a wide base internationally.



SHAPING THE MARKET

Minilec's bench-mark developments have shaped the markets since 1965. For instance, in the year 2002, responding to customer feedback, we introduced multiple options in enclosures of relays, (in addition to the existing D1-D2), P1-P2 and F3 enclosures. This product enhancement gave our customers the much needed flexibility in terms of size and started a trend. Another interesting product development came anticipating a market need, the MBAS 9400 with front replaceable windows, which gave us the edge to win a major tender from Indonesian Electricity Authority against American and Japanese competitors in 1994. This updation in MBAS 9400 has also ensured a continuous flow of orders from the Malaysian Electricity Authority since 1994.

BENCHMARK DEVELOPMENTS 1965-2007

1965:
First to design and manufacture **single phasing preventors in India** and fulfill an emerging market requirement innovatively.

1982:
First to launch micro-processor based alarm annunciator.
(Redesigned as Microwarn 9000 in 1990), this was, and remains the most beautiful alarm annunciator attracting customers across the globe.

1984:
First to introduce super bright LEDs for facia of alarm annunciators.

1987:
First to launch prodless dry run protection device pump guard.
This innovation alone, won us several new customers globally.

1994:
First company in our segment to get ISO 9001.

1997:
First company to introduce RS232 communication port to alarm annunciators.

2000:
Millennium Series (P1 & P2 enclosures) products launched

2005:
MBAS 9700 expanded up to 128 channels.

2006:
Microcontroller based relays replacing existing relays (D1 & D2 series) introduced.

2007:
S2 (Sleek) Series products with microcontroller & SMD technology launched.
This technology has the powerful advantage of added intelligence. State of art SMD technology & microprocessor based design gives higher reliability, multi purpose functionality, reduced size & more value.

2007-08:
Innovative and upgraded new products with latest technology are poised to change the face of the emerging market in India and abroad.



PROGRESS

Every small change or a big expansion that serves the customer better is progress. To us at Minilec, one more pleasant surprise for our customers is progress.

This progress is evident in every area, be it figures of turnover and exports or developments in infrastructure, products and R&D.

INFRASTRUCTURE

40,000 sq.ft Premises

located in clean, green and environment friendly location at Pirangoot Industrial Estate near Pune, includes 10,000 sq.ft of recent addition.

200+ Employees

Highly qualified engineers, R&D experts, quality control technicians and administrative staff; all very well-trained to ensure high quality results.

Sophisticated R&D laboratory



Well-calibrated testing equipments



Manufacturing facility to cater ever-growing customer demands



Innovative designs are made here.



QUALITY FOCUS

QUALITY SYSTEMS

Stringent quality checks by carefully selected vendors, extensive inward inspection and proven production processes continuously improve product quality at Minilec. Minilec's Quality Systems are verified by **BVQI** to be as per **ISO 9001** requirement of international quality standards.

The products are also thoroughly type tested at reputed test houses in India, Singapore, Malaysia and Russia as per the IEC standards.



ACCREDITATIONS

The Models of phase failure relays and alarm annunciators carry **CE** mark and **CSA** Certification.



All Minilec alarm annunciators carry a 5 years' warranty.



'Timely supply of reliable products with innovative features for customer satisfaction.'

– Quality Policy of Minilec

PRODUCTS

WIDEST RANGE

Minilec is the only company in the world offering the widest range of products in all three product segments viz. protection, control and monitoring.

Our products cater to every agro. and industrial segment and provide for the needs of small scale industries as well as corporate giants like Siemens and Reliance.

PRODUCT CATEGORIES

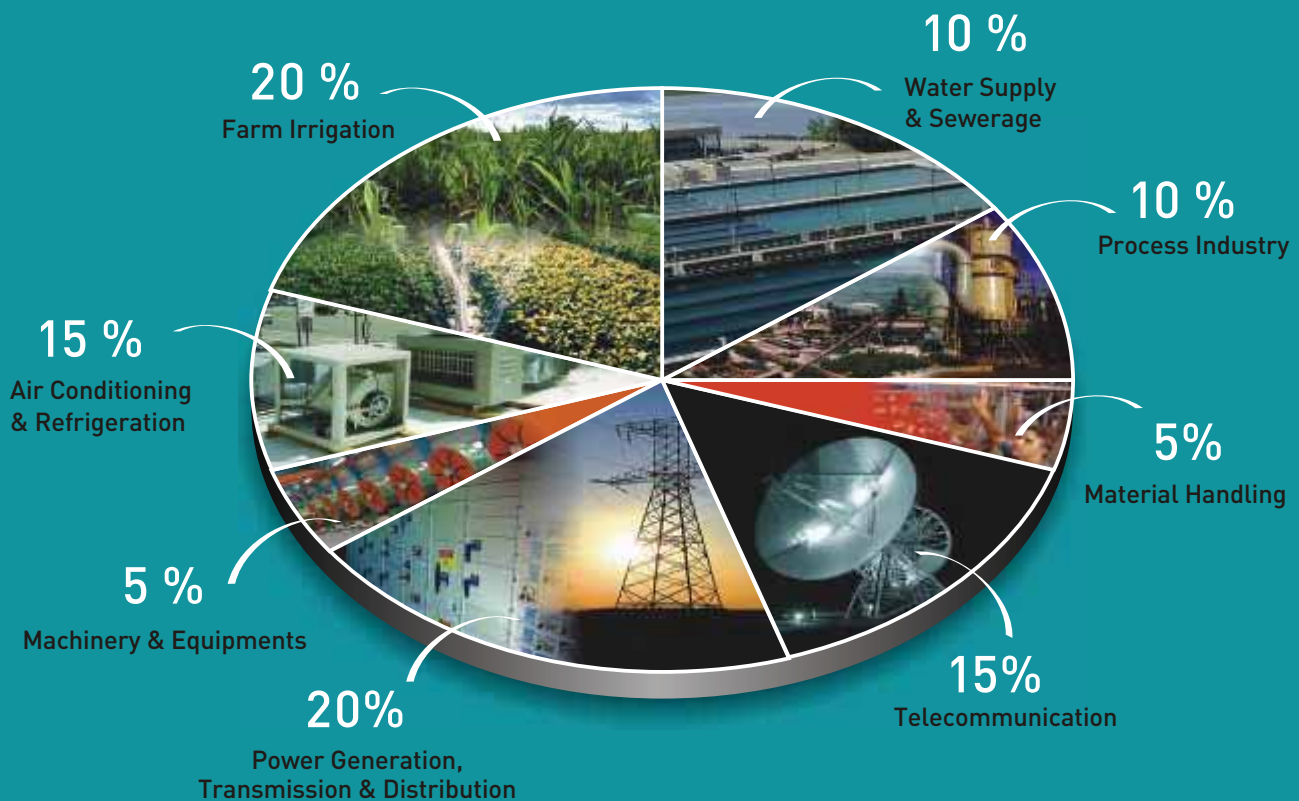
- ▶ Phase Failure Relays
- ▶ Voltage / Current / Frequency / Power Monitoring Relays
- ▶ Motor/Pump Protection Relays
- ▶ Level Controllers
- ▶ Timers
- ▶ Alarm Annunciators
- ▶ Power Line Transducers
- ▶ Pump Automation Products
- ▶ Soft Starters
- ▶ Process & Plant Controllers
- ▶ SCADA Systems

TREND-SETTING DESIGNS

Our product designs today set the trends for the markets in India. Minilec's quality is a standard that even competitors aspire for. Our products are approved by leading industrial project consultants. Growing demand for our products world-wide is a proof of customer acceptance for our products globally. Our products are rated as 'being the best' on the three criteria of Quality, Product Features and Delivery Schedules.

SECTOR DIVERSIFICATION

Omnipresence of our products across agro and industrial sectors.

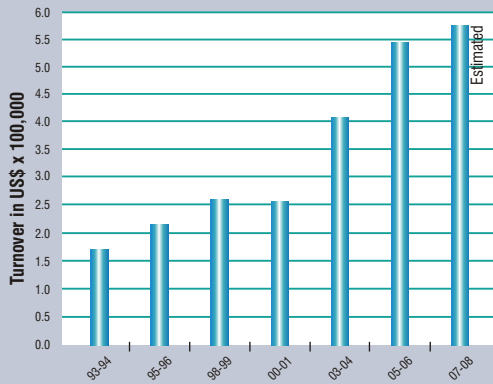
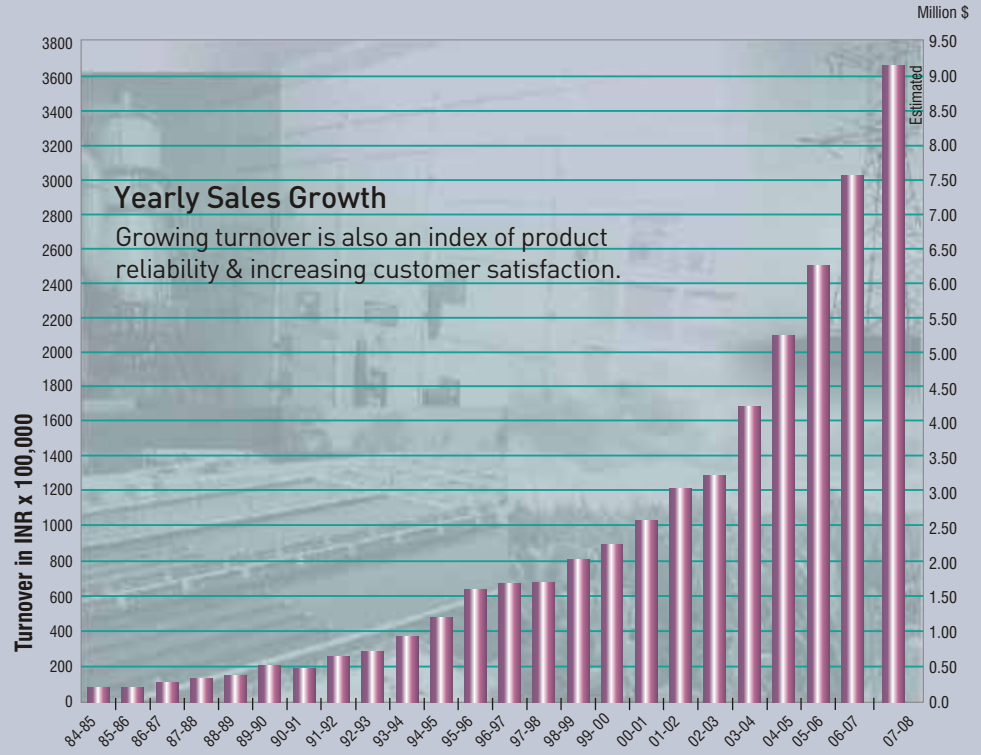


THOROUGH APPROACH TO PRODUCT RELATED EDUCATION

We update our customers & dealers about our latest product range and breakthrough technology through various seminars, training sessions and regular product literature. This ensures optimum utilization of the latest features and technology used in products.

UNDETERRED GROWTH

Turnover has shown a steady increase. Even in times of market lows, Minilec has never found it difficult to keep a growing turnover trend.



EXPORTS :

Exports rose steadily in the initial years, and are now showing a rapid growth fueled by a very encouraging reception of our products globally. Minilec has traditionally exported to **S.E. Asia, Europe and the Middle-East**. Exports to **North and South America** are now increasing substantially.

CUSTOMERS

Minilec's customers span a wide spectrum of segments and scale.

Repeat orders from customers for decades is a very big confirmation of customer delight with our products.



PHASE FAILURE RELAYS

These relays are suitable for monitoring incoming 3-phase supply from Mains (Electricity distribution line). Being independent of load, they can be used for any HP/KW rating of load.



MODELS

VSP D1, VSP D2,
P1PF S1, P1PF S2,
P2PF S1, S2 VMR1,
S2 VMR2, HLS D2,
HLV D2, ALV D2,
VST D1, P2 PFV1,
F3 PFV1, D2 VMR1,
D2 VMR2, S2 VMR3

FEATURES

- Fixed/adjustable unbalance settings
- Fixed/adjustable under-voltage/over-voltage settings
- Fixed/adjustable trip delays
- Built-in or external power supply
- Resetting Auto or Manual
- Output contacts : 1 CO or 2 CO
- Choice of enclosures (DIN-Rail, Plug-in, Flush)
- Models with Micro-Controller based design
- Use of SMD Technology
- User-friendly LED indications

PROTECTIONS / FUNCTIONS

- Phase Failure (Phase Loss / Single Phasing),
- Phase sequence reversal,
- Voltage Unbalance,
- Under Voltage,
- Over Voltage

Ordering Instructions

- ✓ Product Family Name
- ✓ Model Name
- ✓ System Supply Voltage
- ✓ Aux. Supply / Control supply voltage

PHASE FAILURE RELAYS

VSP D1

Phase Failure Relay



Phase Failure, Unbalance, Phase Sequence, Auto Reset, Fixed Unbalance Setting, 1 CO output Relay

VSP D2

Phase Failure Relay



Phase Failure, Unbalance, Phase Sequence, Auto / Manual / Remote Reset, Adjustable Unbalance setting, 2 CO output relay

P1 PFS1

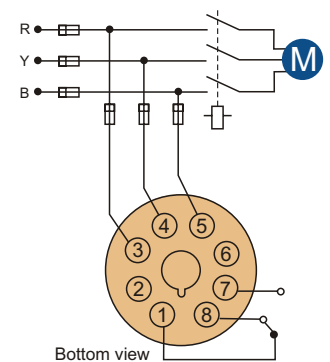
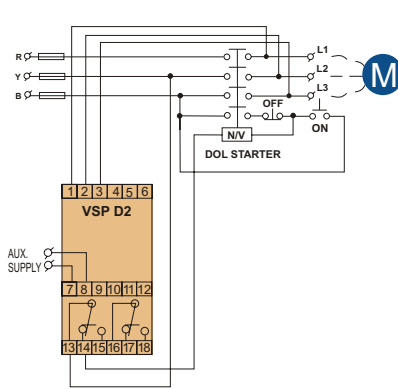
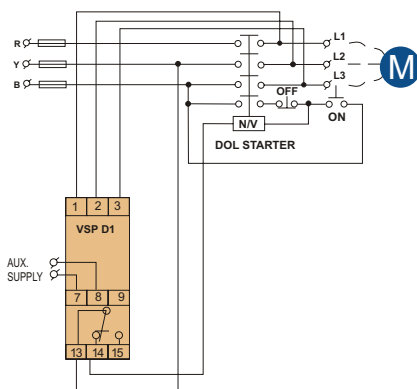
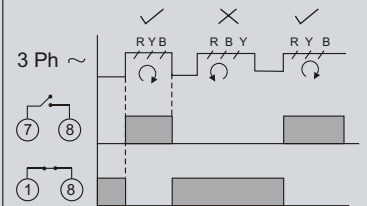
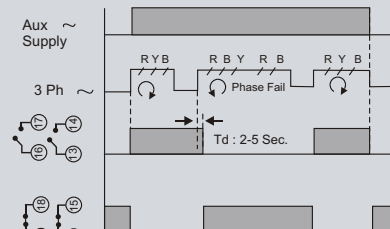
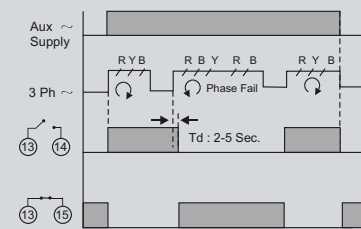
Phase Sequence Relay



Phase Sequence, Phase Loss Auto Reset, 1 CO output relay





Supply Voltage	110/240 / 380 / 415 V AC $\pm 20\%$ 50 / 60 Hz	110/240 / 380 / 415 V AC $\pm 20\%$ 50 / 60 Hz	110 / 240 / 380 / 415 V AC $\pm 10\%$, 50 / 60 Hz
System			
Auxiliary	110 / 240 / 380 / 415 / 440 V AC $\pm 20\%$	110 / 240 / 380 / 415 V AC $\pm 20\%$	Built-in
Output Contacts	1 CO	2 CO	1 CO (Pick-up on correct phase sequence)
Trip Setting (Volts)			
Phase Sequence	Yes	Yes	Yes
Phase Unbalance	40 V ± 6 V (fixed)	30 V to 70 V ± 6 V (adjustable)	N.A.
UV/OV	N.A.	N.A.	N.A.
Trip Time Delay			
On Phase Failure/Sequence	3.5 sec. ± 1.5 sec.	3.5 sec. ± 1.5 sec.	N.A.
Resetting Mode	Auto	Auto / Manual / Remote	Auto
Weight	320 gms.	400 gms.	175 gms.
Dimensions (mm)			
Overall (L x W x D)	76 x 30.5 x 117.5	76 x 56.5 x 117.5	50 x 40 x 80
Mounting (L x W)	68 centre to centre / 35 mm rail Mounting	67 x 46 / 35 mm rail Mounting	8 - Pin Plug-in

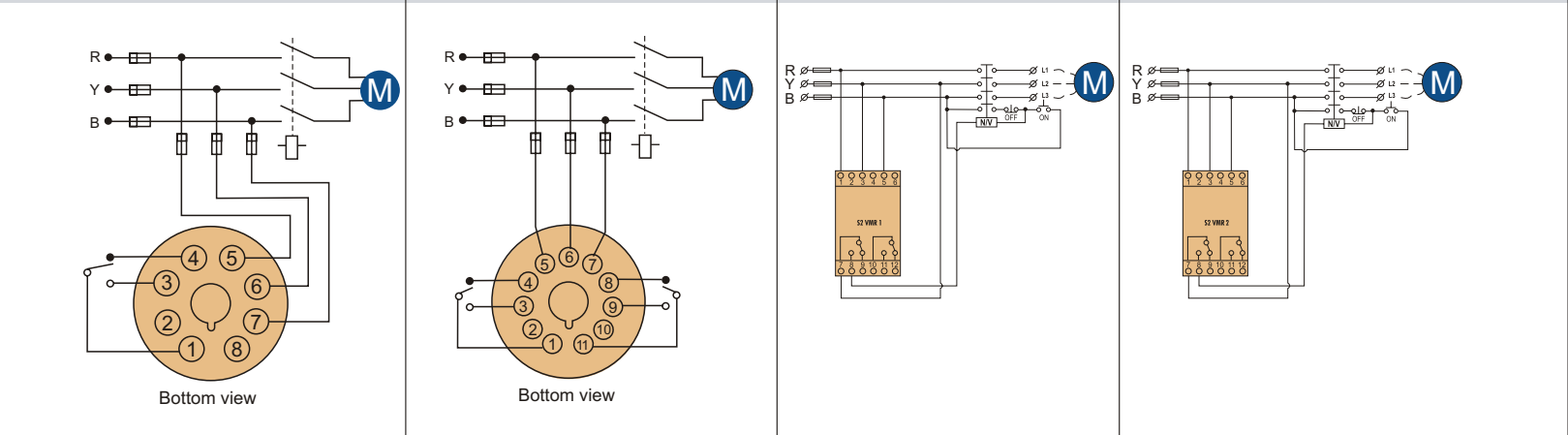
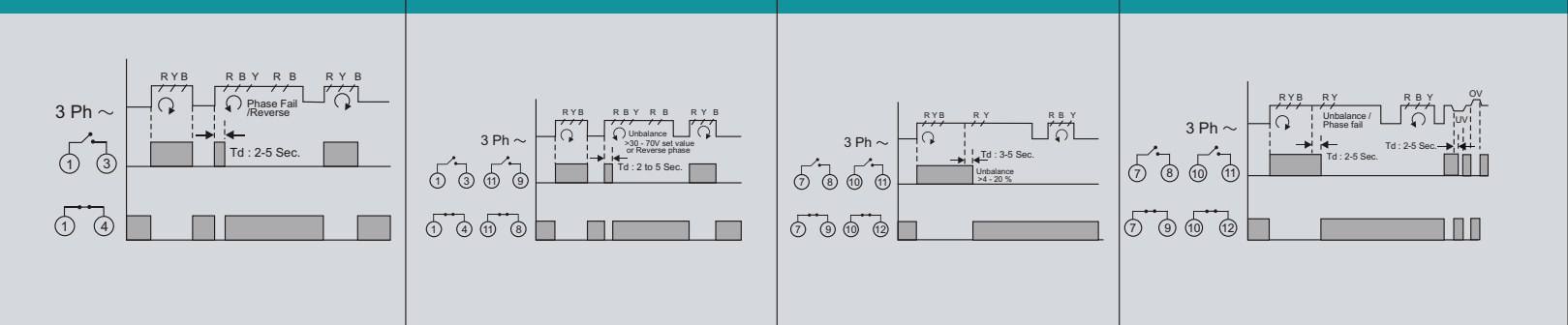
- Wherever not specified Contact Rating : 5A @ 230 V AC (resistive)
- * Available on request.



Relay contact position shown in 'Power on' (Healthy) condition

PHASE FAILURE RELAYS

P1 PFS2 Phase Failure Relay	P2 PFS1 Phase Failure Relay	S2 VMR1 Phase Failure Relay	S2 VMR2 Phase Failure Relay
 <p>Phase Failure, Unbalance, Phase Sequence, Auto reset, fixed unbalance setting, 1 CO output relay</p>	 <p>Phase Failure, Unbalance, Phase Sequence Auto reset, Adjustable Unbalance setting, 2 CO output relay</p>	 <p>Microcontroller design, SMD Technology Phase Failure, Unbalance, Phase Sequence Auto reset, Adjustable Unbalance setting, 2 CO output relay</p>	 <p>Microcontroller design, SMD Technology, Phase Failure, Unbalance, Phase Sequence, under voltage, Over Voltage Auto reset, Fixed Unbalance setting, Fixed UV/OV settings, 2 CO output relay</p>
110 / 240 / 380 / 415 V AC $\pm 10\%$, 50 / 60 Hz	240 / 380 / 415 V AC $\pm 15\%$, 50-60Hz	100-120 / 220-240 / 380-440V AC $\pm 20\%$, 48-63 Hz	100-110-120 / 220-230-240 / 380-415-440V AC $\pm 20\%$, 48-63 Hz Selectable by Front Knob
Built-in 1 CO	Built-in 2 CO	Built In (from 3 Phase) 2 CO	Built In (from 3 Phase) 2 CO
Yes 40V $\pm 6V$ (fixed)	Yes 30 V to 70 V $\pm 6V$ (adjustable)	Yes 4 % TO 20 % (Variable) $\pm 5\%$ of full scale.	Yes 10% (Fixed) $\pm 10\%$
NA.	NA.	NA.	$\pm 20\%$ (Fixed)
3.5 sec. ± 1.5 sec.	1 - 5 secs. (variable)	4 Sec ± 1 Sec / RP-Instant	2 - 5 Sec. (Fixed) / RP-Instant
Auto	Auto	Auto/ Manual Reset (Selectable by Front Push Button)	Auto Reset
175 gms.	250 gms.	100 gms (Approx.)	100 gms (Approx.)
50 x40 x 80 8 - Pin Plug-in	80 x 35 x 95 11 - Pin Plug-in	30 X 60 X 90 35 mm Rail Mounting	30 X 60 X 90 35 mm Rail Mounting



Relay contact position shown in 'Power on' (Healthy) condition

Relay position shown in 'Power off' condition

PHASE FAILURE RELAYS



HLS D2 Phase Failure with UV / OV Relay



Phase Failure, Unbalance, Phase Sequence, under voltage, Over Voltage
Auto reset, Fixed Unbalance setting, Fixed UV/OV settings, 2 CO output relay

HLV D2 Phase Failure with UV / OV Relay



Phase Failure, Unbalance, Phase Sequence, under voltage, Over Voltage
Manual reset, Fixed Unbalance setting, Adjustable UV/OV settings, 2 CO output relay

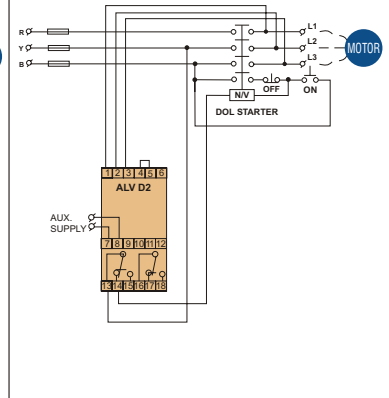
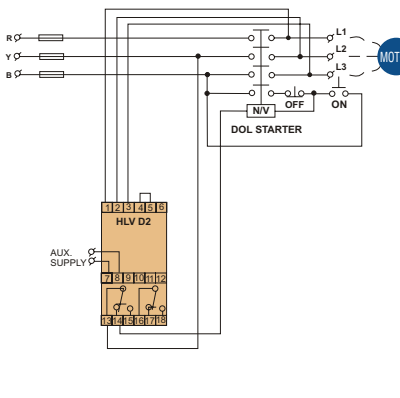
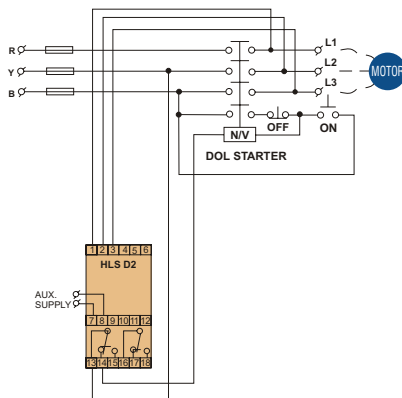
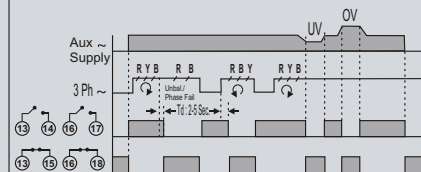
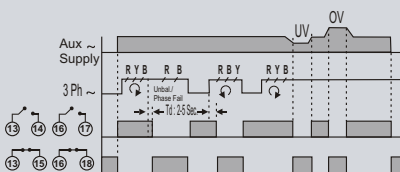
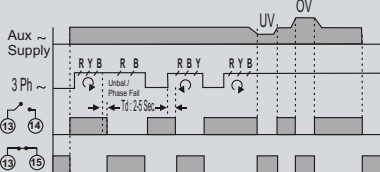
ALV D2 Phase Failure with UV / OV Relay



Phase Failure, Unbalance, Phase Sequence, under voltage, Over Voltage
Auto Reset, Fixed Unbalance setting, Adjustable UV/OV settings, 2 CO output relay

Supply Voltage			
System	240 / 380 / 415 / 440 V AC $\pm 20\%$ 50 / 60 Hz	240 / 380 / 415 / 440 V AC $\pm 20\%$ 50 / 60 Hz	240 / 380 / 415 / 440 V AC $\pm 20\%$ 50 / 60 Hz
Auxiliary	110 / 240 / 380 / 415 / 440 V AC $\pm 20\%$	110 V (Fixed) or (220 - 230 - 240) or	(380 - 415 - 440) V AC $\pm 20\%$ selectable
Output Contacts	2 CO	2 CO	2 CO
Trip Setting (Volts)			
Phase Sequence	Yes	Yes	Yes
Phase Unbalance	40 V ± 6 V (fixed)	40 V ± 6 V (fixed)	40 V ± 6 V (fixed)
Under Voltage	85% ± 5 V (fixed)	80% to 95% (adjustable)	80% to 95% (adjustable)
Over Voltage	110% ± 5 V (fixed)	105% to 120% (adjustable)	105% to 120% (adjustable)
Trip Time Delay			
On Phase Failure	3.5 secs. ± 1.5 sec	3.5 secs. ± 1.5 sec	3.5 secs. ± 1.5 sec
On UV/OV	Less than 2 secs.	Less than 2 secs. for OV & 2 - 5 secs for UV	Less than 2 secs.
Resetting Mode	Auto	Manual / Remote	Auto
Weight	400 gms.	430 gms.	400 gms.
Dimensions (mm)			
Overall (L x W x D)	76 x 56.5 x 117.5	76 x 56.5 x 117.5	76 x 56.5 x 117.5
Mounting (L x W)	67 x 46 / 35 mm rail Mounting	67 x 46 / 35 mm rail Mounting	67 x 46 / 35 mm rail Mounting

- Wherever not specified Contact Rating : 5A @ 230 V AC (resistive)
- * CE marked products available on request.



Relay contact position shown in 'Power on' (Healthy) condition

VST D1

Phase Failure with Under Voltage



Phase Failure, Phase Sequence, under voltage, Auto Reset, Adjustable trip delay, Adjustable UV setting, 1 CO output relay
Selectable range of supply voltage

P2 PFV1

Phase Failure with UV / OV Relay



Phase Failure, Unbalance, Phase Sequence, under voltage, Over Voltage Auto Reset, Fixed Unbalance setting, Adjustable UV/OV settings, 2 CO output relay

F3 PFV1

Phase Failure with UV / OV Relay



Phase Failure, Unbalance, Phase Sequence, under voltage, Over Voltage Auto Reset, Fixed Unbalance setting, Adjustable UV/OV settings, 1 CO output relay

240 / 415 / 575 V AC 3 Phase ($\pm 15\%$ selectable)

Built-in

1 CO

Yes

N.A.

80% of V set

N.A.

0.2 - 10 secs. (variable)

0.2 - 10 secs. (same for UV & SP)

Auto

300 gms.

75 x 30.5 x 117.5

68 centre to centre / 35 mm rail Mounting

380 / 415 V AC $\pm 15\%$, 50/60 Hz

Built-in

2 CO

Yes

40 V ± 6 V (fixed)

85% to 95% (adjustable)

105% to 115% (adjustable)

3.5 secs. ± 1.5 sec

Less than 2 secs.

Auto

250 gms.

80 x 35 x 95

11 - Pin Plug-in

240 / 380 / 415 V AC $\pm 20\%$, 50 / 60 Hz

110 / 240 / 380 / 415 / 440 V AC $\pm 20\%$

1 CO

Yes

40 V ± 6 V (fixed)

80% - 95% (adjustable)

105% - 120% (adjustable)

3.5 secs ± 1.5 sec.

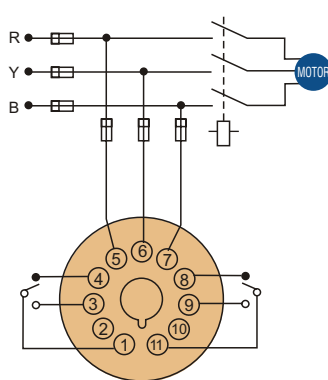
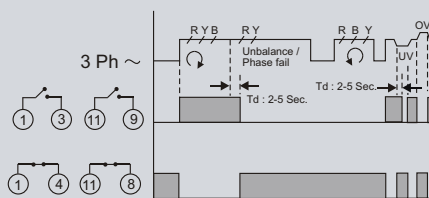
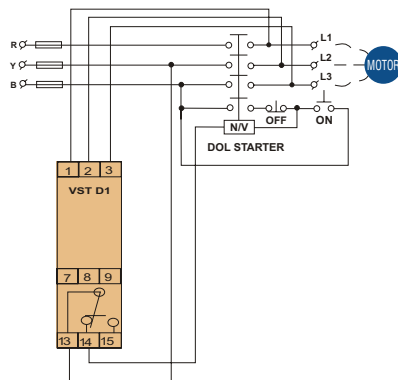
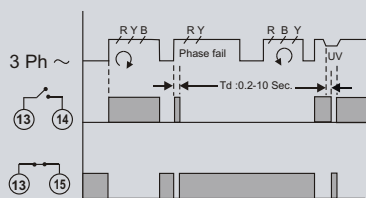
Less than 2 secs.

Auto

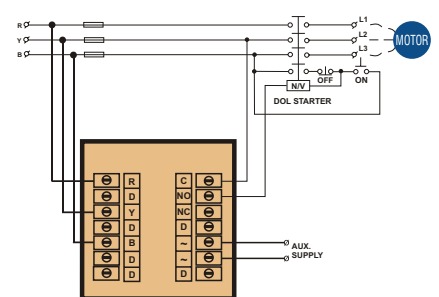
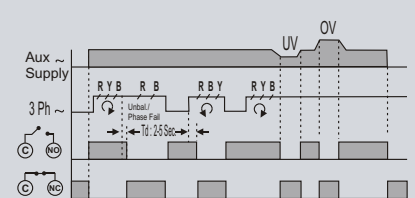
430 gms.

96 x 96 x 76 (Flush mounting)

92 x 92 (cutout)



Bottom view



Relay contact position shown in 'Power on' (Healthy) condition

PHASE FAILURE RELAYS

D2 VMR 1 Phase Failure with UV / OV (3Ø-3W)



Suitable for 3 Ph-3W system,
Microcontroller design,
Absolute values of UV/OV settings,
Phase Failure, Unbalance, Phase
Sequence, under voltage, Over Voltage,
Auto/Manual reset, Adjustable settings for
Unbalance, UV/OV and trip delays,
2 CO output relay

D2 VMR 2 Phase Failure with UV / OV (3Ø-4W)



Suitable for 3 Ph-4W system,
Microcontroller design,
Absolute values of UV/OV settings
Phase Failure, Unbalance, Phase
Sequence, under voltage, Over Voltage
Auto/Manual reset, Adjustable settings for
Unbalance, UV/OV and trip delays,
2 CO output relay

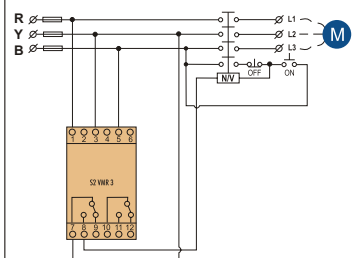
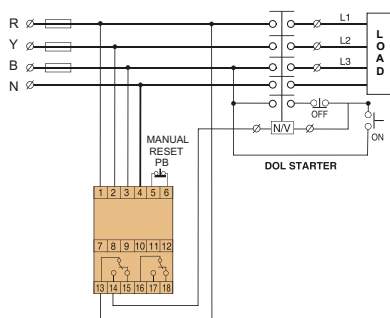
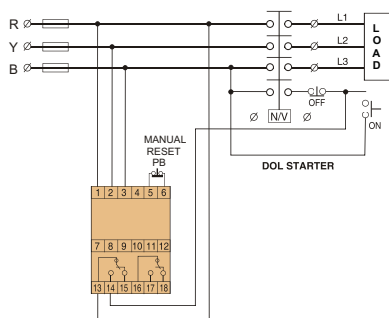
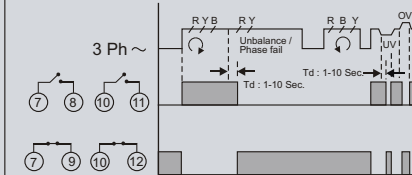
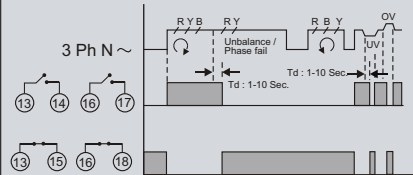
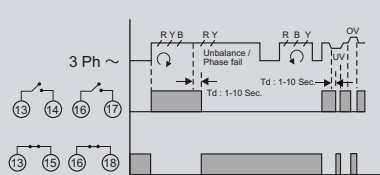
S2 VMR 3 Phase Failure with UV / OV Relay



Microcontroller design,
SMD Technology,
Absolute values of UV/OV settings,
Phase Failure, Unbalance, Phase
Sequence, under voltage, Over Voltage
Auto/Manual reset, Adjustable settings
for Unbalance, UV/OV and trip delays,
2 CO output relay

Supply Voltage			
System	100-120 / 220-240 / 380-440V AC ± 20%, 48-63 Hz	100-120 / 220-240 / 380-440V AC ± 20%, 48-63 Hz	100-120 / 220-240 / 380-440V AC ± 20%, 48-63 Hz
Auxiliary	Built In (from 3 Phases)	Built In (from 3 Phases)	Built In (from 3 Phases)
Output Contacts	2 CO	2 CO	2 CO
Trip Setting (Volts)			
Phase Sequence	YES	YES	YES
Phase Unbalance	4 % - 20 % [Variable]	4 % - 20 % [Variable]	4 % - 20 % [Variable]
Under Voltage	For 380-440V AC For 220-240V AC For 100-120V AC	285-425V AC [Variable] 165-225V AC [Variable] 75-115V AC [Variable]	285-425V AC [Variable] 165-225V AC [Variable] 75-115V AC [Variable]
Over Voltage	For 380-440V AC For 220-240V AC For 100-120V AC	400-520V AC [Variable] 230-290V AC [Variable] 105-140V AC [Variable]	400-520V AC [Variable] 230-290V AC [Variable] 105-145V AC [Variable]
Trip Time Delay			
On Phase Sequence	Instant	Instant	Instant
On SP/UV/OV	1 To 10 Sec [Variable]	1 To 10 Sec [Variable]	1 To 10 Sec [Variable]
Resetting Mode	Auto/ Manual Reset (For NC Push Buttons)	Auto/ External Manual Reset (For NC Push Buttons)	Auto/ Manual Reset [Selectable]
Weight	300 gms.	300 gms.	110 gms (Approx.)
Dimensions (mm)			
Overall (L x W x D)	76 X 56.5 X 117.5	76 X 56.5 X 117.5	35 X 60 X 90
Mounting (L x W)	67 x 46 / 35 mm rail Mounting	67 x 46 / 35 mm rail Mounting	35 mm Rail Mounting

- Wherever not specified Contact Rating : 5A @ 230 V AC (resistive)
- * CE marked products available on request.



Relay position shown in 'Power off' condition

MONITORING RELAYS

VOLTAGE / CURRENT / FREQUENCY / POWER

MONITORING RELAYS

These relays are best suitable for monitoring balanced or unbalanced supplies, either of single phase, 3-phase 3-wire or 3-phase 4 wire loads powered by generators, UPS, stabilizers, inverters, or Mains (by Electricity Boards / Utilities); in AMF panels, PCCs, distribution boards and for power monitoring of individual loads / motors / pumps.



MODELS

VCR D2, D1 VCR1

UVT D1, UVF D1,

VCT D2, VCF D2, D2 VCT1,

S2 VMR 4, S2 VMR 5,

D2 EFR1, CCSD2, OCS D1,

S2 CMR2, S2 CMR3, S2 CMR4,

FCS D2, OFS D1, S2 FMR2,

RPT D2, RPF D2,

PMR D2 + PTS D1,

F3 VSR1, F3 VSR2, F3 VSR3

FEATURES

- Fixed/adjustable under/Over trip settings for parameters.
- Fixed/adjustable trip delays and Power On delays
- Built-in or external power supply
- Resetting – Auto or Manual
- Output contacts : 1 CO or 2 CO
- Choice of enclosures (DIN-Rail, Plug-in, Flush)
- Models with Micro-Controller based design
- 2 line alpha-numeric LCD display (for F3 VSR1/2)
- Serial Communication (RS232) port (for F3 VSR1/2 models)
- Use of SMD Technology
- User-friendly LED indications

PROTECTIONS / FUNCTIONS


- Under/over Voltage,
- Under/Over Current
- Under/Over Frequency
- Under/Over Power
- Reverse Power
- Earth Fault/Ground Fault
- Earth leakage

Ordering Instructions

- ✓ Product Family Name
- ✓ Model Name
- ✓ System Supply Voltage & frequency
- ✓ Aux. Supply/Control supply voltage
- ✓ Current input (1A or 5A)

VOLTAGE MONITORING RELAYS


	VCR D2 1 Phase Voltage Monitoring Relay	D1 VCR 1	VCT D2 Voltage Monitoring Relay, 3Ø-3W	VCF D2 Voltage Monitoring Relay, 3Ø-4W	P2 SMV1 Voltage Monitoring Relay, 3Ø-3W
--	--	----------	---	---	--

Single Phase Under & Over voltage, Auto / Manual Reset, Adjustable under/over voltage settings, adjustable trip delay / ON delay, 2 CO output relay



Single Phase Under & Over voltage, Auto / Manual Reset, Adjustable under / over voltage settings, adjustable trip delay, 2 CO output relay.






3-Phase 3-Wire Under & Over voltage Auto/Manual Reset, Adjustable under/over voltage settings, adjustable trip delay & ON delay, 2 CO output relay



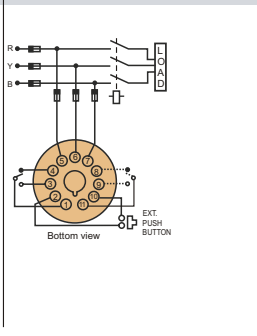
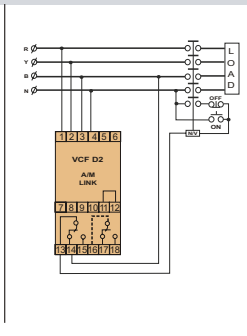
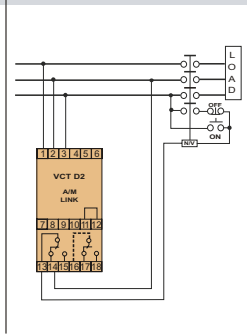
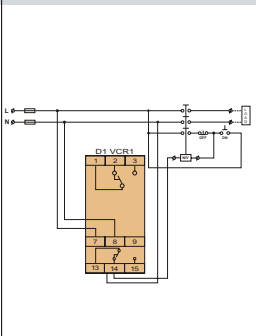
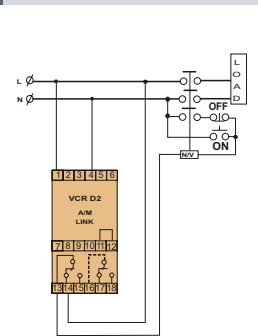
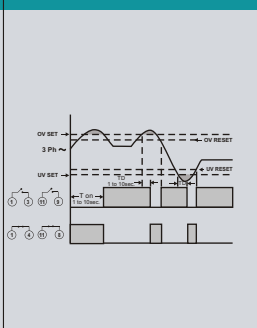
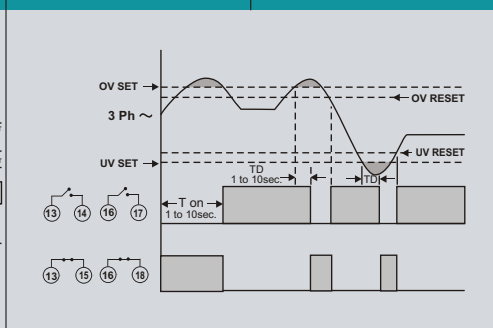
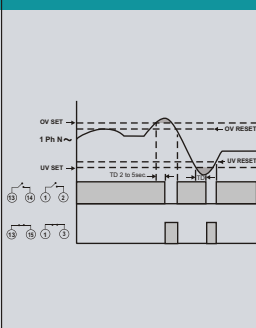
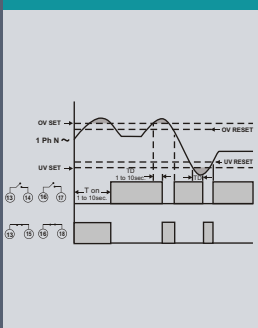
3-Phase 4-Wire Under & Over voltage Auto/Manual Reset, Adjustable under/over voltage settings, adjustable trip delay & ON delay, 2 CO output relay



3-Phase 3-Wire Under & Over voltage Auto/Manual Reset, Adjustable under/over voltage settings, adjustable trip delay & ON delay, 2 CO output relay

System Supply	110 / 240 V AC (+20%, -25%) 50/60Hz	220-240 (+ 20% - 30%), 50/60 Hz ±	110/240/380/415/440 V AC +20%, -25% 50/60Hz		240/380/415 V AC ±15% 50/60Hz
Output Relay Contact	2 CO	2 CO	2 CO	2 CO	2 CO
Trip Setting					
Under Voltage	75% - 95% (adjustable)	75 - 95% [Variable] of set value	75% - 95% (adjustable)	75% - 95% (adjustable)	85% - 95% (adjustable)
Over Voltage	105% - 120% (adjustable)	105 - 120% [Variable] of set value	105% -120% (adjustable)	105% -120% (adjustable)	105% - 115% (adjustable)
Trip Time Delay	1 - 10 secs. (adjustable)	2- 5 Sec (Fixed) (UV/OV)	1-10 secs. (adjustable)	1-10 secs. (adjustable)	1-10 secs. (adjustable)
Power on Delay	1 - 10 secs. (adjustable)	—	1-10 secs. (adjustable)	1-10 secs. (adjustable)	1-10 secs. (adjustable)
Reset	Auto / Manual	Auto Reset	Auto / Manual	Auto / Manual	Auto / Manual
Weight	450 gms.	180 gms.	450 gms.	450 gms.	200 gms.
Dimensions (mm)					
Overall (L x W x D)	76 x 56.5 x 117.5	76 x 30.5 x 117.5	76 x 56.5 x 117.5	76 x 56.5 x 117.5	75 x 35 x 95
Mounting	67 x 46  / 35 mm rail mounting	68 centre to centre / 35 mm rail mounting	67 x 46  / 35 mm rail mounting	67 x 46  / 35 mm rail mounting	11 - Pin plug in

• Wherever not specified
Contact Rating :
5A @ 230 V AC
(resistive)



Relay contact position shown in 'Power on' (Healthy) condition

VOLTAGE MONITORING RELAYS



UVT D1 Under Voltage Relay 3Ø-3W



3-Phase 3-Wire Under voltage
Auto Reset, Adjustable under voltage settings, adjustable trip delay, 1 CO output relay

UVF D1 Under Voltage Relay 3Ø-4W



3-Phase 4-Wire Under voltage
Auto Reset, Adjustable under voltage settings, adjustable trip delay, 1 CO output relay

D2 VCT1 Voltage Monitoring Relay



3-Phase 3-Wire and 3-Phase 4-Wire (selectable) Under & Over voltage, Microcontroller based design, Auto/Manual Reset, Adjustable under/over voltage settings, Absolute values for UV/OV, adjustable trip delay & ON delay, 2 CO output relay (or selectable 1CO for UV, 1CO for OV) Failsafe-non-failsafe selectable

S2 VMR4 Voltage Monitoring Relay, 3Ø-3W



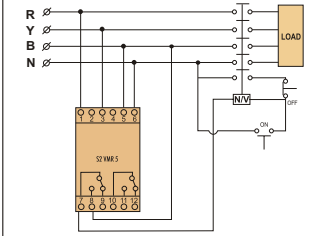
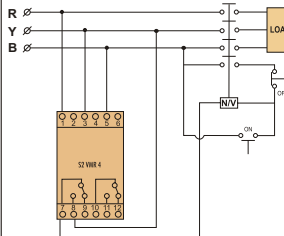
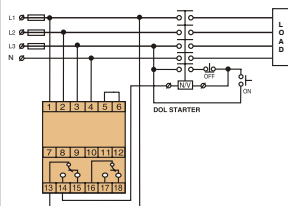
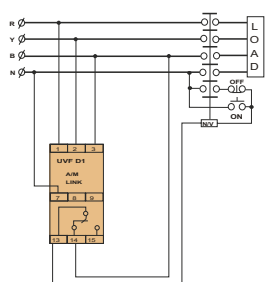
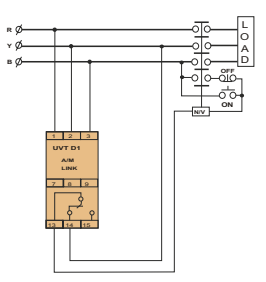
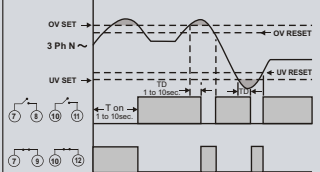
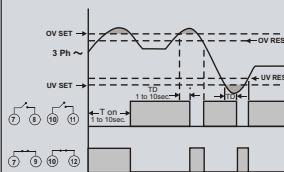
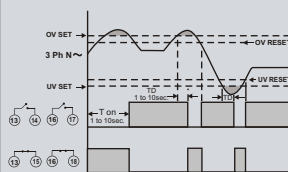
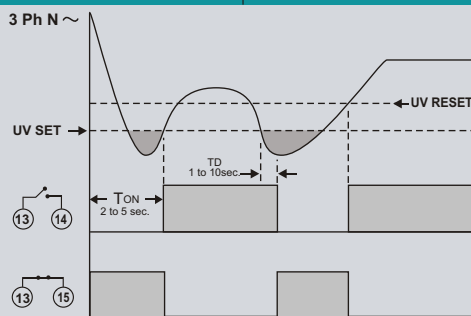
3-Phase 3-Wire Under & Over voltage, Microcontroller based design, SMD Technology Auto/Manual Reset, , Adjustable under/over voltage settings, Absolute values for UV/OV, adjustable trip delay & ON delay, 2 CO output relay (or selectable 1CO for UV, 1CO for OV) Failsafe-non-failsafe selectable

S2 VMR5 Voltage Monitoring Relay, 3Ø-4W



3-Phase 4-Wire Under & Over voltage, Microcontroller based design, SMD Technology Auto / Manual Reset, Adjustable under/over voltage settings, Absolute values for UV/OV, adjustable trip delay & ON delay, 2 CO output relay (or selectable 1CO for UV, 1CO for OV) Failsafe-non-failsafe selectable

110 / 240 / 380 / 415/440 V AC+20 / -25%, 50 / 60 Hz	100-120 / 220-240 / 380-440V AC ± 20%, 50/60 Hz	100-120 / 220-240 / 380-440V AC ± 20%, 48-63 Hz	100-120 / 220-240 / 380-440V AC ± 20%, 48-63 Hz																																																																
1 CO	1 CO	1 CO + 1 CO / 2 CO	1 CO + 1 CO / 2 CO																																																																
75% - 95% (adjustable)	75% - 95% (adjustable)	<table border="1"> <thead> <tr> <th colspan="2">Ph Ph Setting:</th> <th colspan="2"></th> </tr> </thead> <tbody> <tr> <td>For 380-440V AC</td> <td>285-425V AC (Variable)</td> <td>285 - 425V AC (Variable)</td> <td></td> </tr> <tr> <td>For 220-240V AC</td> <td>165-225V AC (Variable)</td> <td>165-225V AC (Variable)</td> <td></td> </tr> <tr> <td>For 100-120V AC</td> <td>75-115V AC (Variable)</td> <td>75-115V AC (Variable)</td> <td></td> </tr> <tr> <th colspan="2">Ph N Sensing:</th> <th colspan="2"></th> </tr> <tr> <td>For 380-440V AC</td> <td>165-245V AC (Variable)</td> <td></td> <td>45-65V AC (Variable)</td> </tr> <tr> <td>For 220-240V AC</td> <td>95-135V AC (Variable)</td> <td></td> <td>90-130V AC (Variable)</td> </tr> <tr> <td>For 100-120V AC</td> <td>45-65V AC (Variable)</td> <td></td> <td>165-245V AC (Variable)</td> </tr> <tr> <th colspan="2">Ph Ph Sensing:</th> <th colspan="2"></th> </tr> <tr> <td>For 380-440V AC</td> <td>400-520V AC (Variable)</td> <td>400-520V AC (Variable)</td> <td></td> </tr> <tr> <td>For 220-240V AC</td> <td>230-290V AC (Variable)</td> <td>230-290V AC (Variable)</td> <td></td> </tr> <tr> <td>For 100-120V AC</td> <td>105-145V AC (Variable)</td> <td>105-145V AC (Variable)</td> <td></td> </tr> <tr> <th colspan="2">Ph N Sensing:</th> <th colspan="2"></th> </tr> <tr> <td>For 380-440V AC</td> <td>230-310V AC (Variable)</td> <td></td> <td>60-80V AC (Variable)</td> </tr> <tr> <td>For 220-240V AC</td> <td>130-170V AC (Variable)</td> <td></td> <td>130-170V AC (Variable)</td> </tr> <tr> <td>For 100-120V AC</td> <td>60-80V AC (Variable)</td> <td></td> <td>230-310V AC (Variable)</td> </tr> </tbody> </table>		Ph Ph Setting:				For 380-440V AC	285-425V AC (Variable)	285 - 425V AC (Variable)		For 220-240V AC	165-225V AC (Variable)	165-225V AC (Variable)		For 100-120V AC	75-115V AC (Variable)	75-115V AC (Variable)		Ph N Sensing:				For 380-440V AC	165-245V AC (Variable)		45-65V AC (Variable)	For 220-240V AC	95-135V AC (Variable)		90-130V AC (Variable)	For 100-120V AC	45-65V AC (Variable)		165-245V AC (Variable)	Ph Ph Sensing:				For 380-440V AC	400-520V AC (Variable)	400-520V AC (Variable)		For 220-240V AC	230-290V AC (Variable)	230-290V AC (Variable)		For 100-120V AC	105-145V AC (Variable)	105-145V AC (Variable)		Ph N Sensing:				For 380-440V AC	230-310V AC (Variable)		60-80V AC (Variable)	For 220-240V AC	130-170V AC (Variable)		130-170V AC (Variable)	For 100-120V AC	60-80V AC (Variable)		230-310V AC (Variable)
Ph Ph Setting:																																																																			
For 380-440V AC	285-425V AC (Variable)	285 - 425V AC (Variable)																																																																	
For 220-240V AC	165-225V AC (Variable)	165-225V AC (Variable)																																																																	
For 100-120V AC	75-115V AC (Variable)	75-115V AC (Variable)																																																																	
Ph N Sensing:																																																																			
For 380-440V AC	165-245V AC (Variable)		45-65V AC (Variable)																																																																
For 220-240V AC	95-135V AC (Variable)		90-130V AC (Variable)																																																																
For 100-120V AC	45-65V AC (Variable)		165-245V AC (Variable)																																																																
Ph Ph Sensing:																																																																			
For 380-440V AC	400-520V AC (Variable)	400-520V AC (Variable)																																																																	
For 220-240V AC	230-290V AC (Variable)	230-290V AC (Variable)																																																																	
For 100-120V AC	105-145V AC (Variable)	105-145V AC (Variable)																																																																	
Ph N Sensing:																																																																			
For 380-440V AC	230-310V AC (Variable)		60-80V AC (Variable)																																																																
For 220-240V AC	130-170V AC (Variable)		130-170V AC (Variable)																																																																
For 100-120V AC	60-80V AC (Variable)		230-310V AC (Variable)																																																																
1 - 10 secs. (adjustable)	1- 10 secs. (adjustable)	1-10 Sec (Variable) SP/UV/OV	1-10 Sec. (Variable)																																																																
3.5 secs. ±1.5 secs.	3.5 secs ±1.5 secs	1-10 Sec (Variable)	1 10 Sec (Variable)																																																																
Auto	Auto	Auto/ Manual Reset	Auto / Manual Reset																																																																
175 gms.	175 gms.	300 gms (Approx.)	110 gms (Approx.)																																																																
76 x 30.5 x 117.5	76 x 30.5 x 117.5	76 X 56.5 X 117.5	35 X 60 X 90																																																																
68 centre to centre / 35 mm rail mounting	68 centre to centre / 35 mm rail mounting	67 x 46 mm / 35 mm rail mounting	35 mm Rail Mounting																																																																



Relay position shown in 'Power on' (Healthy) condition

Relay position shown in 'Power off' condition

CURRENT MONITORING RELAYS



CCS D2 1 Phase Current Monitoring Relay



Single phase under & over current
Auto/Manual reset,
Input 1A or 5 A through CT,
Adjustable under/over current trip settings,
Adjustable trip delay & ON delay,
2 CO output relay

OCS D1 1 Phase Over Current Relay



Single phase over current
Auto reset,
Input 1A or 5 A through CT,
Adjustable over current trip settings,
Adjustable trip delay,
1 CO output relay

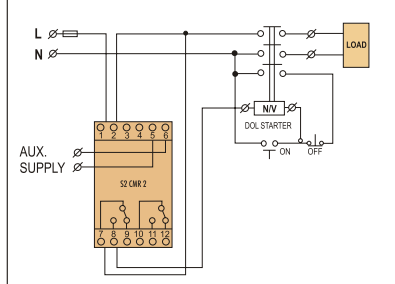
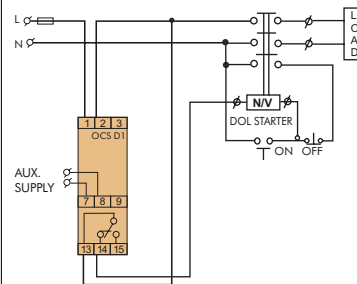
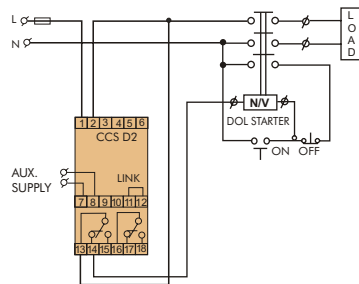
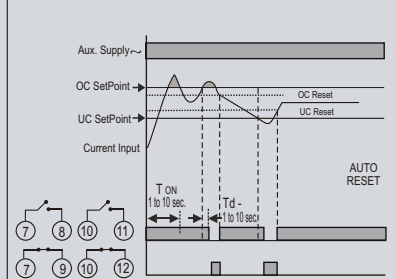
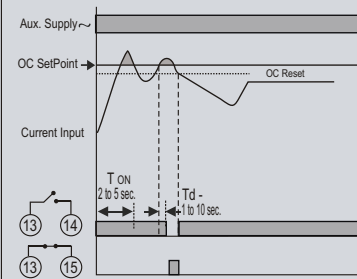
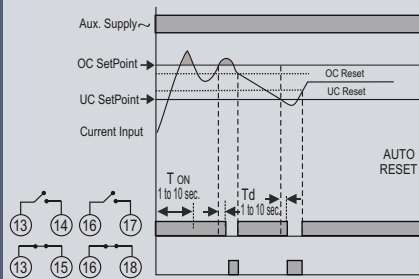
S2 CMR2 1 Phase Current Monitoring Relay



Single phase under & over current
Microcontroller based design, SMD technology, Auto/Manual reset, Input 1A or 5 A through CT, Adjustable under / over current trip settings, adjustable trip delay & ON delay, 2 CO output relay (or selectable 1CO for UC, 1CO for OC)
Failsafe-non-failsafe mode selectable

Supply Voltage System Auxiliary	110 / 240 / 380 / 415V AC ±20%, 12 V DC / 24 / 30 V DC ±10%	110 / 240 V AC ±20%, 24 V DC ±10%
Ext. Input	1 Amp or 5 Amp (Selectable) CT	1 Amp or 5 Amp (Secondary) CT
Output contact	2 CO	1 CO
Output contact	2 CO	1 CO + 1 CO
Trip setting		
EF Trip Setting	—	—
Under Current	10%-100% (adjustable)	N.A.
Over Current	50% -140% (adjustable) of CT sec	50% -140% (adjustable) of CT sec
Power On Delay	1 - 10 secs (adjustable)	3.5 secs ± 1.5 sec (fixed)
Trip Time Delay	1 - 10 secs (adjustable)	1 - 10 secs (adjustable)
Resetting	Manual / Auto	Auto
Weight	550 gms.	250 gms.
Dimensions (mm)		
Overall (L x W x D)	76 x 56.5 x 117.5	76 x 30.5 x 117.5
Mounting (L x W)	67 x 46 / 35 mm rail Mounting	68 centre to centre / 35 mm rail Mounting
Mounting (L x W)		35 mm Rail Mounting

• Wherever not specified
Contact Rating :
5A @ 230 V AC
(resistive)



Relay contact position shown in 'Power on' (Healthy) condition

Relay position in 'Power off' condition

D2 EFR1 Earth Fault Relay



Earth fault/Ground fault monitoring of 3 phase systems
Manual Reset,
Input 1A or 5A through CBCT,
Adjustable earth fault trip setting,
adjustable trip delay,
2 CO relay output

S2 CMR3 Ground Fault Relay



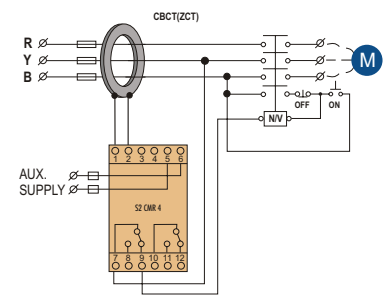
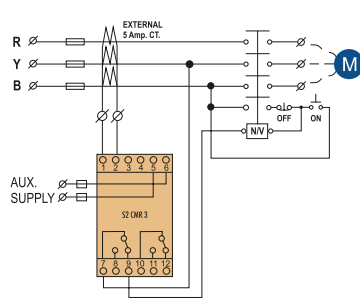
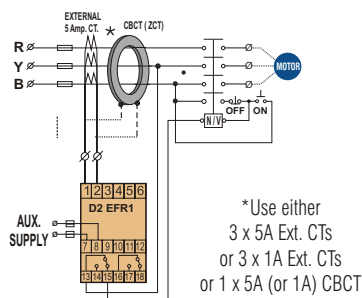
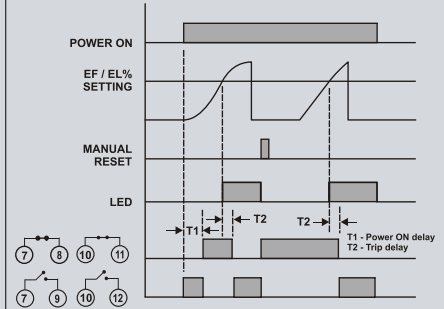
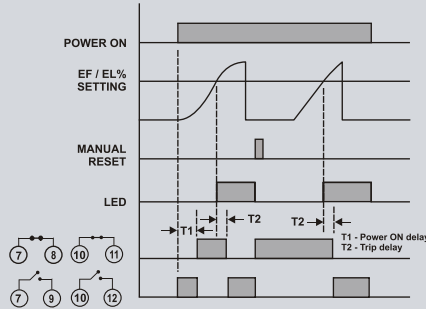
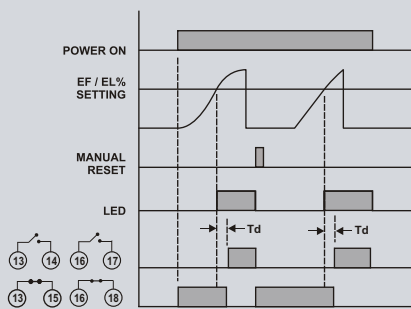
Earth fault/Ground fault monitoring of 3 phase systems, Microcontroller based design, SMD technology, Manual Reset,
Input 1A or 5A through CBCT,
Adjustable earth fault trip setting,
Adjustable trip delay & ON delay,
2 CO relay output
Failsafe-non-failsafe seletable

S2 CMR4 Earth Leakage Relay



Earth leakage monitoring of 3 phase systems, Microcontroller based design, SMD technology, Manual Reset,
Input through CBCT,
Adjustable trip setting,
Adjustable trip delay & ON delay,
2 CO relay output
Failsafe-non-failsafe seletable

110 / 240 / 380 / 415 V AC $\pm 20\%$	100-110/240/380/415V AC $\pm 20\%$, 48-63 Hz 100-110/240V AC / 24V DC $\pm 20\%$	100-110/240/380/415/440V AC $\pm 20\%$, 48-63 Hz 100-110/240V AC / 24V DC $\pm 20\%$
1A or 5A (Selectable) CBCT 1 CO (2 CO) (Pick up on Fault)	2 CO	2 CO
10% -100% (adjustable) of CT sec	10% - 100% of Rated Current Input (Variable) (Input through CT of 1AMP or 5AMP Secondary)	10% - 100% of Rated Current Input (Variable) (Input through CBCT of 300m A Secondary)
N.A.	N.A.	N.A.
N.A.	N.A.	N.A.
N.A.	1 -10 Sec.(Adjustable)	1 -10 Sec.(Adjustable)
0.1-1.0 / 1-10 Sec. (Adjustable)	0.1 - 1 Sec.(Adjustable)	0.1 Sec to 1 Sec.(Adjustable)
Manual / Remote (Selectable)	Manual	Manual
550gms.	140 gms	140 gms
76 x 56.5 x 117.5 67 x 46 / 35 mm rail Mounting	35 X 60 X 90 35 mm Rail Mounting	35 X 60 X 90 35 mm Rail Mounting



Relay position in 'Power on' (Healthy) condition

Relay position shown in 'Power off' condition

FREQUENCY MONITORING RELAYS



FCS D2 Frequency Monitoring Relay



Single phase under & over frequency
Auto reset,
Adjustable under/over frequency trip settings,
Adjustable trip delay & ON delay,
2 CO output relay

OFS D1 Over Frequency Relay



Single phase over frequency
Auto reset,
Adjustable over frequency trip settings,
Adjustable trip delay,
1 CO output relay

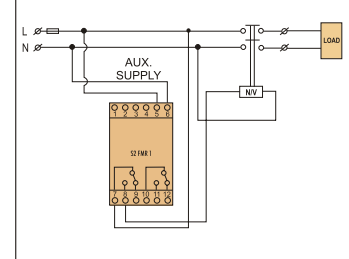
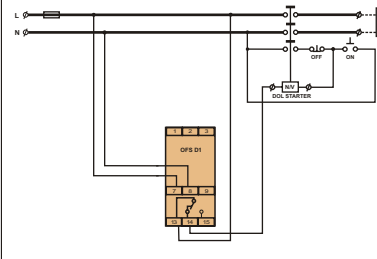
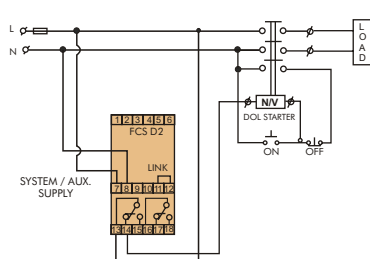
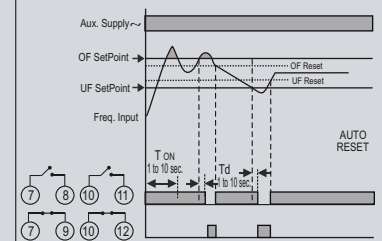
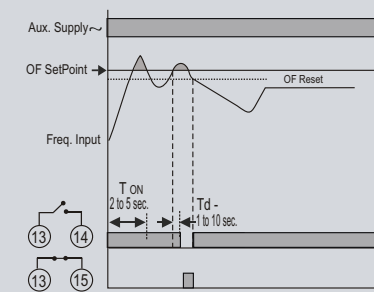
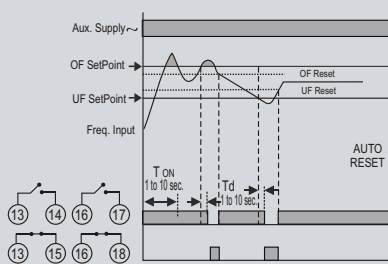
S2 FMR1 Frequency Monitoring Relay



Single phase under & over frequency,
Microcontroller based design, SMD technology, Auto reset,
Adjustable under/over frequency trip settings,
Adjustable trip delay & ON delay,
2 CO output relay
Failsafe-non-failsafe mode selectable

Supply Voltage			
System	110 / 240 / 380 / 415 V AC $\pm 20\%$	110 / 240 / 380 / 415 V AC $\pm 20\%$	100-110/240V AC $\pm 20\%$, 38-72 Hz
Auxiliary	Built-in	12 / 24 V DC or Built in	In Built or 24V DC $\pm 20\%$
Ext. Input	—	—	—
Output contact	2 CO	1 CO	1 CO + 1 CO
Trip setting			
Under Current	—	—	—
Over Current	—	—	—
Under Frequency	40 Hz - 60 Hz (variable)	N.A.	40 Hz - 60 Hz (Variable)
Over Frequency	50 Hz - 70 Hz (variable)	50 Hz - 70 Hz	50 Hz - 70 Hz (Variable)
Under Power	—	—	—
Over Power	—	—	—
Reverse Power	—	—	—
Power On Delay	1 - 10 secs. (adjustable)	3.5 secs. ± 1.5 sec (fixed)	1 - 10 Sec. (Adjustable) ± 1 Sec.
Trip Time Delay	1 - 10 secs. (adjustable)	1 - 10 secs. (adjustable)	1 - 10 Sec. (Adjustable) ± 0.1 Sec.
Resetting	Auto	Auto	Auto / Manual
Weight	450 gms.	450 gms.	130 gms
Dimensions (mm)			
Overall (L x W x D)	76 x 56.5 x 117.5	76 x 30.5 x 117.5	35 X 60 X 90
Mounting (L x W)	67 x 46 / 35 mm Rail Mounting	68 centre to centre / 35 mm Rail Mounting	35 mm Rail Mounting

• Wherever not specified
Contact Rating :
5A @ 230 V AC
(resistive)



Relay contact position shown in 'Power on' (Healthy) condition

Relay position in 'Power off' condition

POWER MONITORING RELAYS



RPT D2

Reverse Power Relay, (3Ø-3W)



3-phase 3-wire generators reverse power monitoring
Auto/Manual reset,
Reverse power (current) trip settings adjustable,
ON delay and trip delay adjustable,
2 CO output relay

3 Ph/3 W, 110/240/380/415 V AC $\pm 20\%$
Built-in
5A, CT & R,Y, B
2 CO

2% - 20% (adjustable)
1 - 10 secs. (adjustable)
1 - 10 secs. (adjustable.)
Auto / Manual
460 gms.

76 x 56.5 x 117.5
67 x 46 / 35 mm Rail Mounting

RPF D2

Reverse Power Relay, (3Ø-4W)



Single phase or 3-phase 4-wire generators reverse power monitoring
Auto/Manual reset,
Reverse power (current) trip settings adjustable,
ON delay and trip delay adjustable,
2 CO output relay

3 Ph/4 W, 110/240/380/415 V AC $\pm 20\%$
Built-in
5A, CT & R,Y, B
2 CO

2% - 20% (adjustable)
1 - 10 secs. (adjustable)
1 - 10 secs. (adjustable)
Auto / Manual
460 gms.

76 x 56.5 x 117.5 x 27
67 x 46 / 35 mm Rail Mounting

PMR D2 + PTS D1

Motor Power Monitoring Relay

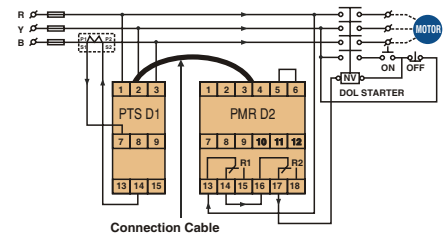
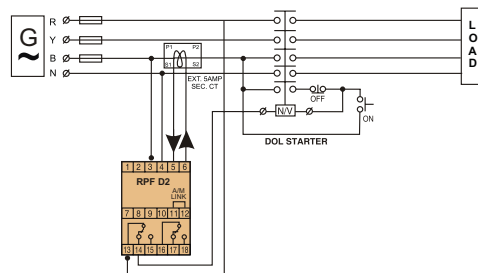
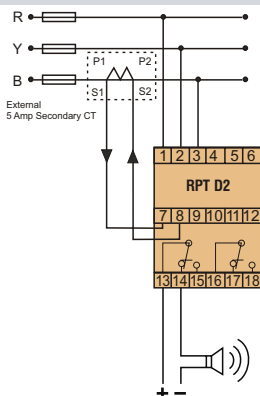
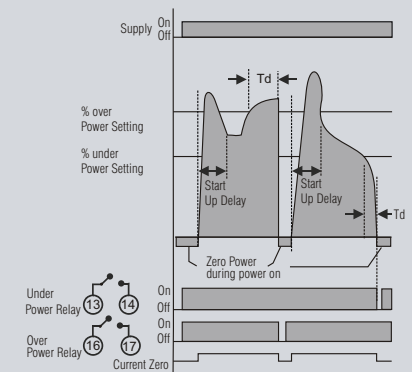
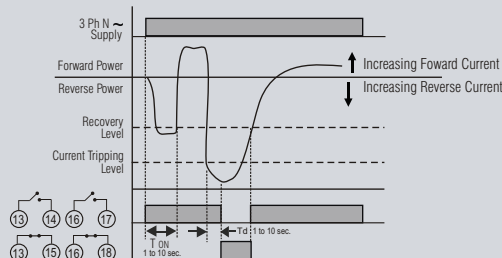
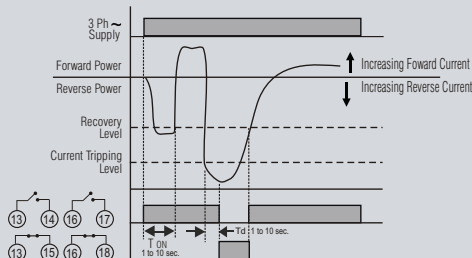


Under Power & Over Power Monitoring
Auto/Manual Reset,
Adjustable UP/OP settings,
Adjustable On delay and trip delay,
2 CO output relays

3 Ph/3 W, 110/240/380/415 V AC $\pm 20\%$
Built-in
PTS D1 (1A/5A CT & 3Ph)
1 CO + 1 CO

10% - 100% (adjustable)
10% - 100% (adjustable)
1 - 10 secs. (adjustable)
1 - 10 secs. (adjustable)
Auto / Manual
400 gms.

76 x 56.5 x 117.5
67 x 46 / 35 mm Rail Mounting



Relay contact position shown in 'Power on' (Healthy) condition

VOLTAGE SCANNERS & CONTROLLERS

F3 VSR1 Voltage Scanner 3Ø-3W



3-Phase 3-Wire voltage monitoring & display, Phase Failure, Unbalance, Phase Sequence, under voltage, Over Voltage, Auto / Manual Reset, Adjustable unbalance trip setting, Adjustable under/over voltage settings, adjustable trip delay, RS232 communication port, 2 CO output relay

F3 VSR2 Voltage Scanner 3Ø-4W



3-Phase 4-Wire voltage monitoring & display, Phase Failure, Unbalance, Phase Sequence, under voltage, Over Voltage, Auto / Manual Reset, Adjustable unbalance trip setting, Adjustable under/over voltage settings, Adjustable trip delay, RS232 communication port, 2 CO output relay

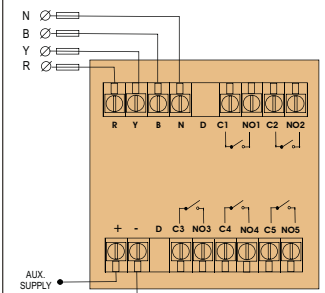
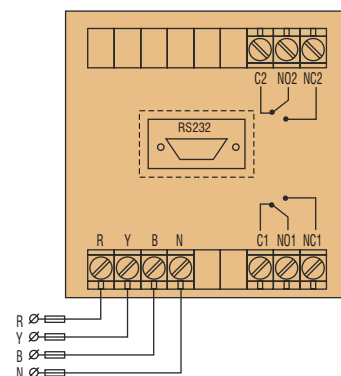
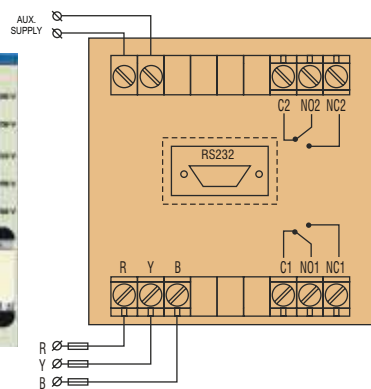
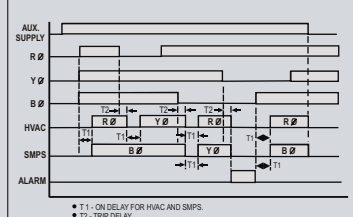
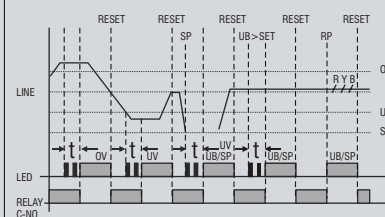
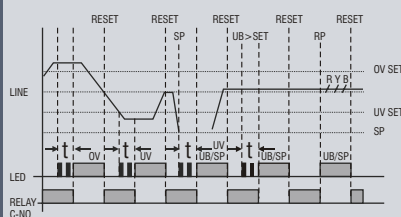
F3 VSR3 Voltage Scanner & Phase Selector



3-phase 4-wire system voltage monitor with phase selector Under voltage and over voltage monitoring Auto reset, Adjustable UV/OV trip settings, Adjustable trip delay, 5x1NO output relays.

Supply voltage			
System	380 / 415 V AC (3 Ph - 3 W)	380 / 415 V AC (3 Ph - 4 W)	415 VAC, + 20 % -30 %, 50 Hz / (60Hz) ± 3 %
Auxiliary	90-270 V AC/DC	Self Powered (Neutral & any Phase)	48 VDC ± 10 %
Output relay contacts	2 CO & RS 232 (optional)	2 CO & RS 232 (optional)	5 Nos. x 1NO.
Trip setting			
Phase Sequence	Yes	Yes	No
Phase Unbalance	1 - 10 % (Adj.)	1 - 10 % (Adj.)	
Under Voltage	1 - 80V below nominal voltage	1 - 50V below nominal voltage	75 % TO 95 % [VARIABLE BY POT]
Over Voltage	1 - 60V above nominal voltage	1 - 25V above nominal voltage	105 % TO 120 % [VARIABLE BY POT]
Trip time delay	1 - 60 secs. or 1-5 mins select.	1 - 60 secs. or 1-5 mins select.	1-10 SEC. [VARIABLE BY POT]
Reset	Manual	Manual	AUTO
Display	Backlit LCD (16 x 2 character)	Backlit LCD (16 x 2 character)	—
Monitoring	Phase to Phase	Phase to neutral	Phase to neutral
Weight	800 gms.	800 gms.	900 gms.
Dimensions (mm)			
Overall (L x W x D)	96 x 96 x 130	96 x 96 x 130	96 x 96 x 130
Mounting (L x W)	92 x 92	92 x 92	92 x 92
	RP, UV / OV and UB Protection override facility provided	RP, UV / OV and UB Protection override facility provided	On Delay - 3mins ± 10%

• Wherever not specified
Contact Rating :
5A @ 230 V AC
(resistive)



PROTECTION RELAYS

MOTOR / PUMP PROTECTION RELAYS

These relays are useful for protection of 3-phase AC induction motors against various hazards. With their unique advantages they eliminate use of a thermal/bimetal relay for motor protection. Being current sensing, they are to be selected according to motor rating and are available for practically all ranges of motors. These relays are ideally suitable for Air-conditioning Compressor motor protection, as also for motors in machines, conveyors, cranes/hoists and lifts, and for pumps.



MODELS

MPR D2, SPG D2, F3 DRC1, D2 MPR1, D2MPR2, S2 CMR1 CTS5, CTS10, CTS20, CTS40, CTS80, CTS120, S2 CTS, MBMPR, M-Commander, WTR D1, S2 WTR1,

FEATURES

- Fixed/adjustable unbalance settings
- Fixed/adjustable settings for under/over voltage, current, load
- Fixed/adjustable trip delays
- Resetting Auto or Manual
- Output contacts : 1 CO or 2 CO
- Choice of enclosures (DIN-Rail, Flush)
- Models with Micro-Controller based design
- Serial Communication (RS485) port
- 2 line alpha-numeric LCD display
- Use of SMD Technology
- User-friendly LED indications

PROTECTIONS / FUNCTIONS

- Phase Failure (Phase Loss/Single Phasing),
- Phase sequence reversal,
- Voltage Unbalance,
- Under Voltage,
- Over Voltage,
- Overload protection as per motor characteristics
- No-load/dry running
- Motor Winding overheating
- Over-current/Short circuit/locked rotor
- Earth Fault
- Moisture/leakage

Ordering Instructions

- ✓ Product Family Name
- ✓ Model Name
- ✓ System Supply Voltage & frequency
- ✓ Aux. Supply/Control supply voltage
- ✓ Motor/Pump rating (HP/KW) & duty
- ✓ Overload characteristics required
- ✓ No. of PTCs & Temp. graph

MOTOR / PUMP PROTECTION RELAYS



MPR D2 Overload Protection Relay with Phase Failure



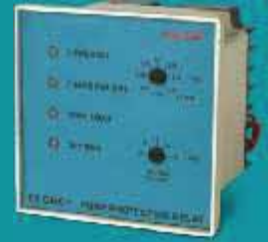
Phase Failure, Unbalance, Phase sequence and overloading
Auto / Manual Reset,
Adjustable current trip settings,
selectable characteristics,
1CO/2CO output relay

SPG D2 Dry Run & Overload Protection Relay with Phase Failure



Phase Failure, Unbalance, Phase sequence, Overloading & Dry running
Auto/Manual Reset,
Adjustable current trip settings,
selectable overload characteristics,
1CO/2CO output relay

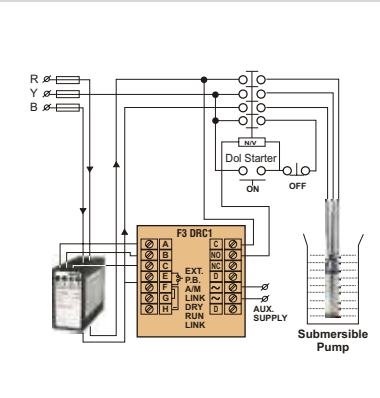
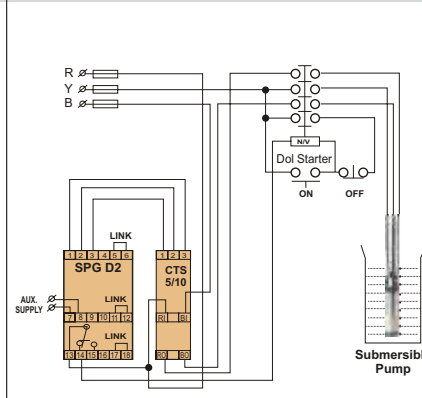
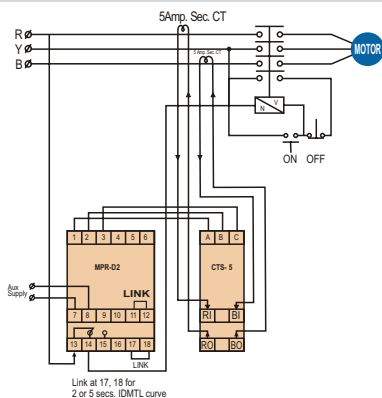
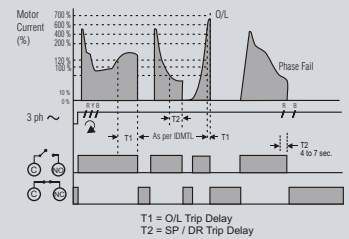
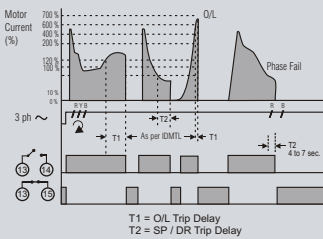
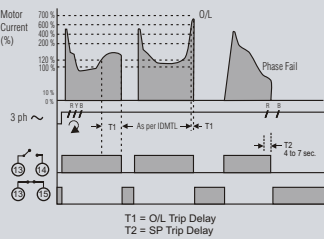
F3 DRC1 Dry Run & Overload Protection Relay with Phase Failure



Phase Failure, Unbalance, Phase sequence, overloading and dry running
Auto/Manual Reset,
Adjustable current trip settings,
Adjustable overload characteristics,
1CO output relay






Supply Voltage System	380/415/440V AC $\pm 20\%$	240/380/415 V AC $\pm 20\%$	240/380/415 V AC $\pm 20\%$ 50/60 Hz $\pm 3\%$
Auxiliary	110/240/380/415 V AC/24 V AC $\pm 20\%$, 50 / 60 Hz	110/240/380/415/440 V AC / 24 V AC $\pm 20\%$, 50/60 Hz	110 / 240 / 380/ 415 V AC $\pm 20\%$ 50 / 60 Hz
Output Relay Contact	1 CO (2 CO)	1 CO	1 CO
Input	From CTS	From CTS	From CTS
Trip Setting			
Phase to phase unbalance	50% of motor Current $\pm 10\%$	50% of motor Current	50% of FLC
Under current (Dry running)	N.A.	50%/75% of set current	50% or 75% of I SET
Overload	Above 120% of set Current (IDMTL)	Above 120% of set current (IDMTL)	Above 120% of set current (IDMTL)
UV/OV	N.A.	N.A.	N.A.
Trip type delay			
On phase failure	5.5 secs. ± 1.5 secs.	5.5 secs. ± 1.5 secs.	5.5 secs. ± 1.5 secs.
For overloading	As per selectable inverse time Characteristics (2 secs. / 5 secs.) or 10 secs. or 15 secs. or 20 secs. (optional)	As per selectable inverse time Characteristics (2 / 5 secs (10 secs.)	As per selectable inverse time Characteristics 2 - 10 secs. (variable)
UV/OV RP	N.A.	N.A.	N.A.
Resetting	Auto / Manual / Remote	Auto / Manual / Remote	Auto / Manual / Remote
Dimensions (mm)			
Overall (L x W x D)	76 x 56.5 x 117.5	76 x 56.5 x 117.5	96 x 96 x 76
Panel mounting (L x W)	67 x 46 / 35 mm Rail Mounting	67 x 46 / 35 mm Rail Mounting	92 x 92
Approx Weight	425 gms.	425 gms.	425 gms.

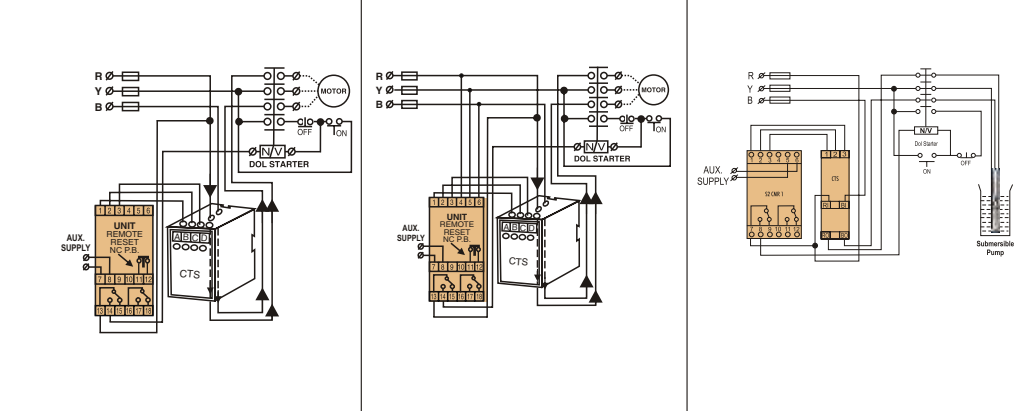
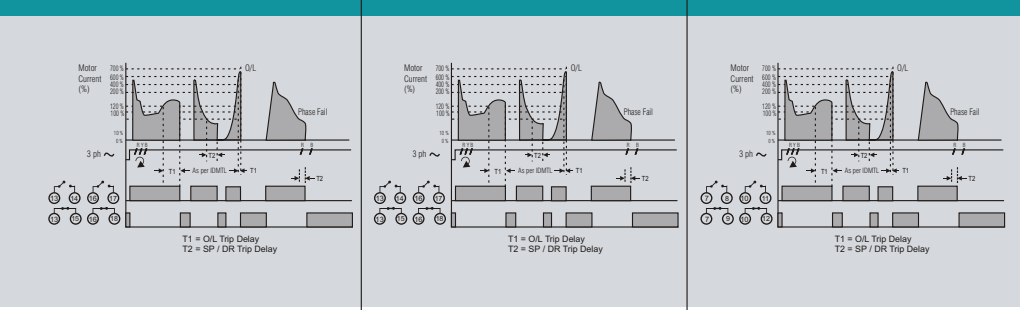
Wherever not specified
Contact Rating :
5A @ 230 V AC (resistive)



MOTOR / PUMP PROTECTION RELAYS



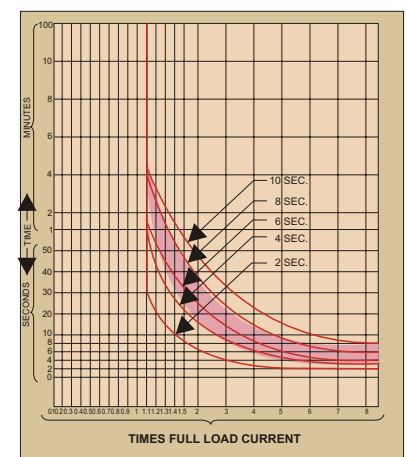
D2 MPR1 Dry Run & Overload Protection Relay with Phase Failure	D2 MPR2 Dry Run & Overload Protection with Phase Failure & UV+OV	S2 CMR1 Dry Run & Overload Protection Relay with Phase Failure	CTS5 CTS10	CTS20, CTS40, CTS80
 <p>Phase Failure, Unbalance, Phase sequence and overloading, Auto/Manual Reset, Adjustable current trip settings, Test Facility, UC bypass facility, selectable overload characteristics, 2CO output relay</p>	 <p>Sensing both voltage and current signals, Phase Failure, Unbalance, Phase sequence, under over voltage, overloading and dry running. Manual Reset, Delayed auto reset, fixed trip settings, fixed overload characteristics, 2CO output relay</p>	 <p>Phase Failure, Unbalance, Phase sequence, overloading and dry running (Under current) Microcontroller based design, SMD technology, Auto/Manual Reset, Adjustable current trip settings, selectable overload characteristics, 2CO output relay</p>	 <p>Current sensor suitable for motor current of 5A (for CTS 5) & of 10A (for CTS 10) & for Higher ratings with external CT. To be used with Minilec relays only.</p>	 <p>Current sensor suitable for full load motor current of 20A (for CTS 20), of 40A (for CTS 40) & 80 A (for CTS 80) To be used with Minilec relays only.</p>
415 / 440V AC \pm 20%, 45-65 Hz 220-240 / 380-440V AC 2 CO -	380-440V AC \pm 20%, 48-63 Hz 220-240 \pm 20% 2 CO -	100-120/220-240/380-440V AC \pm 20%, 48-63 Hz 100-120/220-240 \pm 20%, 24V DC +10% - 15% 2 CO -	N.A. N.A. 3-wire Output Motor Primary current carrying cables for R&B phases	N.A. N.A. 3-wire Output
50% of Motor Current (Fixed) 50% to 80% of set current (Adj. with Bypass facility) As per inverse time characteristics N.A. 4 Sec \pm 1 Sec	50% of Motor Current (Fixed) 50% of set current (Fixed) As per inverse time characteristics UV = -20% (Fixed) OV = +20% (Fixed) 4 Sec \pm 1%	50% of Motor Current (Fixed) 40% to 80% of set current As per inverse time characteristics N.A. 4 Sec \pm 1 Sec (Fixed)	N.A. N.A. N.A. N.A.	N.A. N.A. N.A. N.A.
As per Inverse Time Characteristics 2/5/10 Sec. (Selectable) N.A. Auto/ Manual (Remote with NC Push Button)	As per Inverse Time Characteristics 2 Sec. (Fixed) For UV/OV - 4 Sec \pm 1 Sec for RP - Instant Delayed Auto	As per Inverse Time Characteristics 2/5/10 Sec. (Selectable) N.A. Auto / Manual	N.A. N.A.	N.A. N.A.
56.5 x 117.5 x 76 /35 mm Rail Mounting 400 gms	56.5 x 117.5 x 76 /35 mm Rail Mounting 400 gms	89 x 17.5 x 59 35 mm Rail Mounting 140 gms	76 x 30.5 x 117.5 68 centre to centre/ 240 gms.	76 x 38 x 113 68 centre to centre/ CTS 20 : 260 gms. CTS 40 : 275 gms. CTS 80 : 330 gms.



Relay position shown in 'Power off' condition

Selection Chart for CTS.

HP	KW	Amp	CTS Model
<3	<2.25	2 - 5	CTS 05
<6	<4.5	4 - 10	CTS 10
<12.5	<9.4	8 - 20	CTS 20
<30	<22.5	16 - 40	CTS 40
<60	<45	32 - 80	CTS 80
<75	<56	48 - 120	CTS 120



MICROPROCESSOR BASED MOTOR PROTECTION RELAY

MBMPR

Comprehensive Motor Protection Relay

S2 CTS1

Current Sensor



Microcontroller based.
Sensing voltage, current and temperature
Phase Failure, Unbalance, Phase sequence, Under/over voltage, overloading, winding over temperature, Over current/Short circuit, locked rotor Auto/Manual resetting, Adjustable trip settings for UV/OV, UC/OC, O/L, Locked rotor & earth fault, On delay & start-up delay adjustable, 2x1CO output relays



Current sensor suitable for full load motor current of 5A, 10A & 20A. To be used with Minilec relays only.

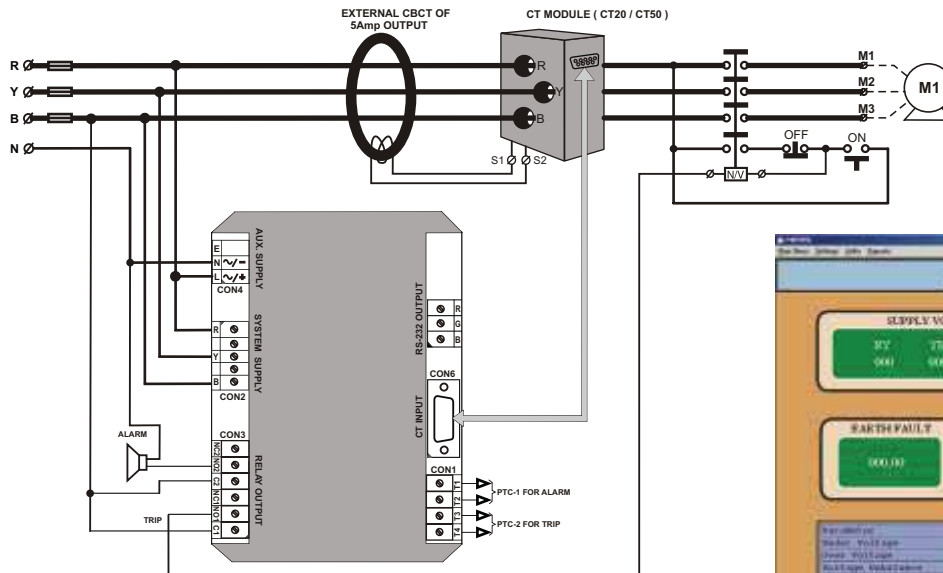
Supply Voltage	System	415V AC $\pm 20\%$, 3 ϕ , 3 Wire, 50 / (60)Hz $\pm 3\%$			
	Auxiliary	90-270V AC / DC			
Output Relay Contact		1 CO for Trip & 1 CO for Alarm / RS 232/485 Port			
Input		External CTS (CT20/50)			
Power Consumption		8 VA			
Trip Setting	Settings	Trip Level	Trip Delay	LED	Reset Mode
	Power ON	—	—	★	—
	Unbal/Ph.Rev	1% - 20%	1-10 Secs.	★	Auto / Manual
	Under Voltage	75% - 95%	1-10 Secs.	★	Auto / Manual
	Over Voltage	105% - 120%	1-10 Secs.	★	Auto / Manual
	Current unbalance	20-60% of Imax	1-10 Secs.	★	Multi Attempt
	Current phase Loss	—	1-10 Secs.	★	Multi Attempt
	Under Current (dry run) for CDR-M	30-90% of Imax	1-10 Secs.	★	Multi Attempt
	Over Current/Short Circuit	300% - 800% of Imax	2-25 Secs.	★	Multi Attempt
	Overload	2/5/10/15/20 Sec.	As per IDMTL char.	★	Manual
	Lock Rotor	200%-500% of Imax	1-10 Secs.	★	Manual
	Earth Fault	30% - 80%	0.5 - 10 Secs.	★	Manual
	Winding Overheat	4K1 - 5K6	1-20 Secs.	★	Auto / Manual
Display		16x2 Ch. (Back lit)			
Dimensions (mm)					
Unit Overall (L x W x D)		166 x 216 x 80	CT20/CT50 : 35 x 60 x 90		
	Panel mounting (L x W)	153 x 203	: 35mm Rail Mounting		
Approx Weight Unit		600 gms	CT20/CT50 : 150gms		

3-wire Output	Input from Motor Primary current carrying cables for R&B phases
Dimensions (mm)	
Overall (L x W x D)	35 X 60 X 90
Mounting	35 mm Rail Mounting
Approx Weight	140 gms.

CTS Selection Chart

Model	Current
S2 CTS 5	2-5
S2 CTS 10	4-10
S2 CTS 20	8-20

Wherever not specified
Contact Rating :
5A @ 230 V AC (resistive)



M-COMMANDER

Pump Management & Protection System

CTS120

Current Sensor

Commander-M is a micro-processor based Motor protection and Pump management system, suitable for 2 pumps. Sensing voltage, current and temperature Phase Failure, Unbalance, Phase sequence, Under/over voltage, overloading, dry running, winding over temperature, Over current/Short circuit, locked rotor Auto/Manual resetting, Adjustable trip settings for UV/OV, UC/OC, O/L, Locked rotor & earth fault, On delay & start-up delay adjustable, 2x1CO output relays



Current sensor suitable for full load motor current of 120A. To be used with Minilec relays only.

Motor protection Includes

- Over/Under voltage protection
- Single/Reverse phasing protection
- Voltage / Current unbalance
- Overload trip
- Over current protection
- Dry running protection
- Earth fault protection
- PTC based winding overheating protection

Pump Management System Features

- Auto Change over between two pumps
- Intelligent resetting facility
- On-site programming facility
- Password protection for programming
- Pump On-Off timer programmable for 10 times a day, with advance programming of 7 days
- Provision for water level control
- Run-time compensation
- Ideal for Pump Automation & Unmanned Pumping Stations.

PARAMETERS	SPECIFICATIONS
Supply Voltage	
System	415 V AC $\pm 20\%$, 50/60Hz $\pm 3\%$
Auxiliary	90-270 VAC/DC $\pm 20\%$, 50Hz
Output Contacts	4 x 1 CO Relays (for 1 pump)
Current sensor	External CTS (CT20 / CT50)
Reset	Auto/ Multi-Attempt / Manual
Unbalance	1-20% $\pm 6V$ for Voltage Unbalance 20-60% $\pm 5\%$ of current unbalance
Overload	As per inverse time characteristics
Over Current / Short Circuit	300% - 800%
Locked Rotor	200% - 500%
Earth Fault	30% - 80%
Winding Overheating	As per PTC temperature characteristics
Under Voltage	75% - 95% of system supply (adjustable)
Over Voltage	105%-120% of system supply (adjustable)
Dry Running	30-90% of Imax
Display	16x2 Ch. (Backlit)
Level Control	Upper tank full Lower tank empty
Weight	800gms

Wherever not specified Contact Rating : 5A @ 230 V AC (resistive)

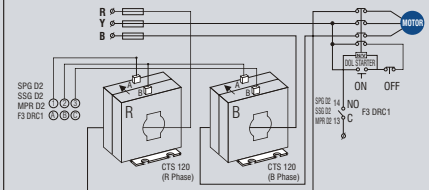
3-wire Output

Input from Motor Primary current carrying cables for R&B phases

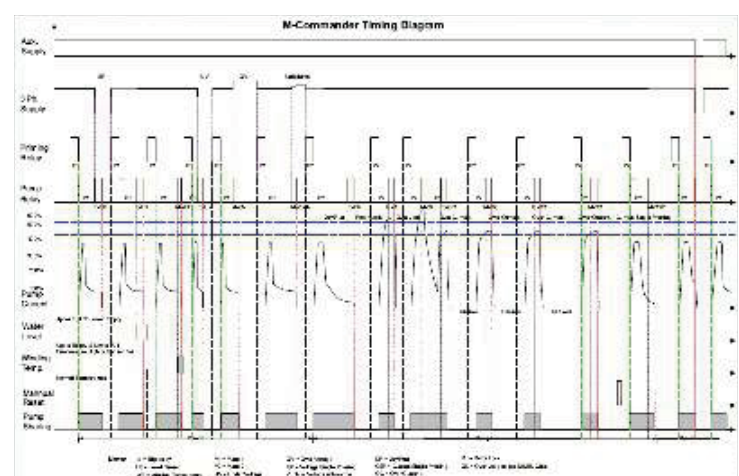
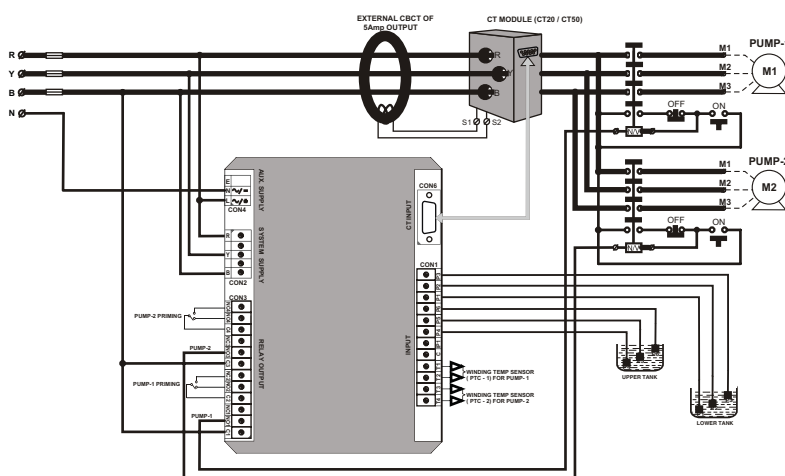
Dimensions (mm)

Overall (L x W x D) 76 x 78 x 96.5
Mounting (L x W) 62 x 51

Approx Weight 190 gms. each



For more detailed specifications, refer table on page No. 26 (MBMPR)



WINDING OVER-TEMPERATURE PROTECTION RELAYS

WTR D1

Winding Protection Relay



Sensing motor winding temperature through PTC Thermistors, Winding overheating, sensor short, sensor open faults Suitable for single, triple or 6/9/12 PTCs

S2 WTR1

PTC Thermistor Relay



Sensing motor winding temperature through PTC Thermistors, Winding overheating, sensor short, sensor open faults Suitable for single, triple or 6/9/12 PTCs

PTC

Thermistor



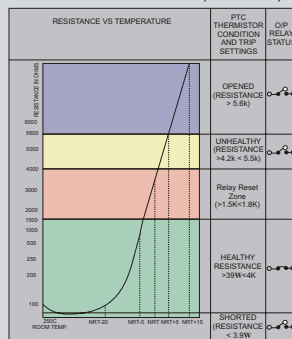
Supply Voltage Auxiliary	24 / 48 / 110 / 240 / 380 / 415 / 440V AC / 24 V DC $\pm 10\%$	12/24V DC / 110/230/415V AC, 50 Hz (60 Hz)
Output Contacts	1 CO	1 CO
Trip Setting		
Thermistor Sensor Healthy	40 ohm - 4 K ohm	40 Ω 4K Ω
Thermistor Sensor Trip	4.1 K ohm - 5.5 K ohm	4.1K Ω 5.5K Ω
Thermistor Sensor Open	5.6 K ohm & above	5.6K Ω & Above
Thermistor Sensor Short	40 ohm & below	0 - 39 Ω
Trip time delay	Less than 2 secs.	Less than 1 Sec (Fixed)
Resetting Mode	Auto / Manual (optional)	Auto / Manual (Optional)
Dimensions (mm)		
Overall (L x W x D)	76 x 30.5 x 117.5	90 x 60 x 35
Mounting (L x W)	68 mm centre to centre / 35 mm Rail Mounting	35 mm Rail Mounting
Weight	300 gms.	250 gms.

PTC Thermistors are semi conductor sensors. These have typical characteristics that change their resistance instantly at a specified pre-defined response temperature (NRT). As soon as the surrounding temperature of PTC reaches it's NRT value the body resistance of PTC Thermistor rises sharply from 200 / 250 Ohms to more than 5000 Ohms. The PTC Thermistors are embedded in the overhang location of the motor windings.

The NRT value of PTC is selected according to the Insulation Class of the copper windings of motor or transformers.

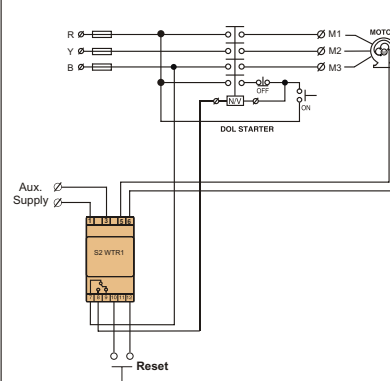
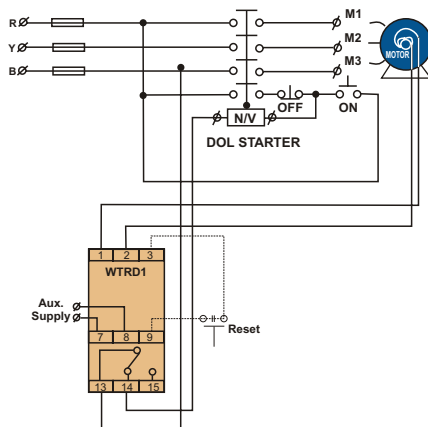
Wherever not specified
Contact Rating :
5A @ 230 V AC (resistive)

TYPICAL CHARACTERISTICS OF PTC (THERMISTOR)



Selection Chart for NRT of PTC Thermistors.

NRT $^{\circ}\text{C}$	Class of Ins.	Cable Colour Code
70	-	White - Brown
80	-	White - White
90	-	Green - Green
100	A	Red - Red
110	-	Brown - Brown
120	E	Grey - Grey
130	B	Blue - Blue
140	-	White - Blue
150	F	Black - Black
160	-	Blue - Red
170	H	White - Green
180	C	White - Red
190	-	Orange - Black



ELECTRONIC TIMERS

ELECTRONIC TIMERS

Minilec offers timers for various functions and applications, in various enclosures/sizes and with multi voltage options



MODELS

ETS D1, ETA D1,
P1 STS1, P1 STM1,
ESD D1, ESR D1,
D1 ETM1, S2ETM1
ETR D2, D2 ETR1,
S2 ETM2

FEATURES

- Single voltage & Multi-voltage
- Single function and multi-function
- Wide time range
- Better repeat Accuracy
- Choice of enclosures (DIN-Rail, & Plug-in)
- Models with Micro-Controller based design
- Use of SMD Technology (S2 Series models)

FUNCTIONS

- On Delay
- Interval Delay
- Cyclic ON/OFF
- Multi-Attempt (for Engine Starting)
- Star-Delta changeover

Ordering Instructions

- ✓ Product Family Name
- ✓ Model Name
- ✓ Aux. Supply/Control supply voltage
- ✓ Application

ON DELAY TIMERS



ETS D1 On Delay Timer



On Delay, time range upto 3 hours,
2 CO output relay

ETA D1 On Delay Timer (Multivoltage)



On Delay, time range 30 Minutes, Multi-voltage supply,
2 CO output relay

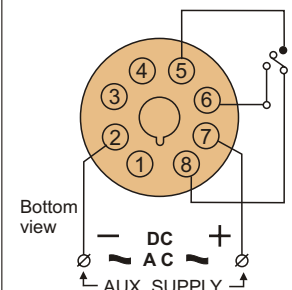
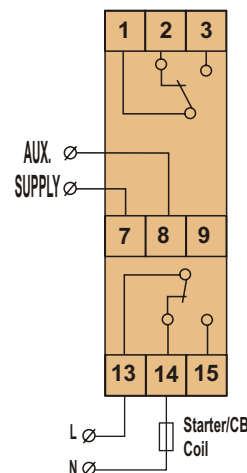
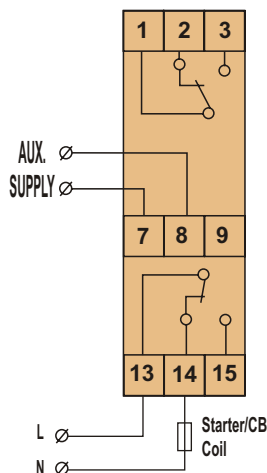
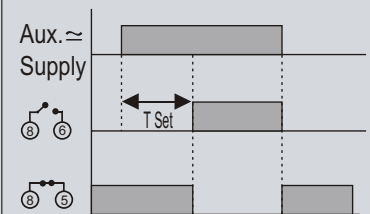
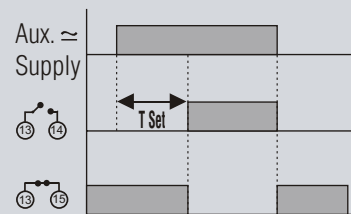
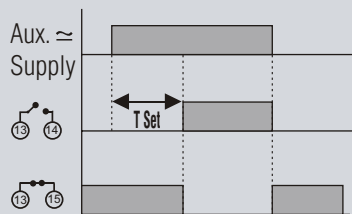
P1 STS1 On Delay Timer (Seconds)



On Delay, time range upto 60 seconds,
1 CO output relay

Supply Voltage Auxiliary	24/110 / 240 / 380 / 415 V AC \pm 20%, 12 / 24 V DC \pm 20%	24-240 V AC / DC +10%, -20%	110 / 230 / 380 / V 415 V AC \pm 10%, 12/24 V DC
Output Contacts	2 CO	2 CO	1 CO
Time Range	0.3 - 3, 0.6 - 6 secs. 1 - 10, 3 - 30, 6 - 60, 18 - 180 (secs. or mins.)	0.7 secs. - 30 mins. (4 ranges) On Delay	0-3, 0-10, 0-30, 0-60 secs.
Operating Modes	On Delay	On Delay	On Delay
Weight	300 gms.	160 gms.	175 gms.
Dimensions (mm)			
Overall (L x W x D)	76 x 30.5 x 120	76 x 30.5 x 117.5	50 x 40 x 80
Mounting (L x W)	68 mm centre to centre / 35 mm Rail Mounting	68 centre to centre / 35 mm Rail Mounting	8 - pin plug-in

Wherever not specified
Contact Rating :
5A @ 230 V AC (resistive)

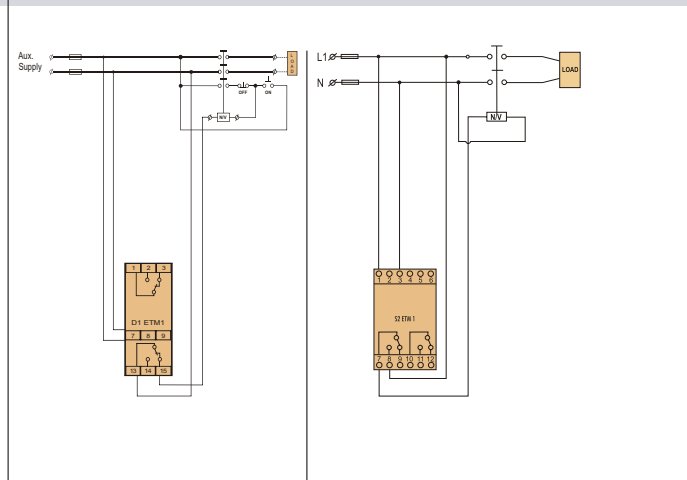
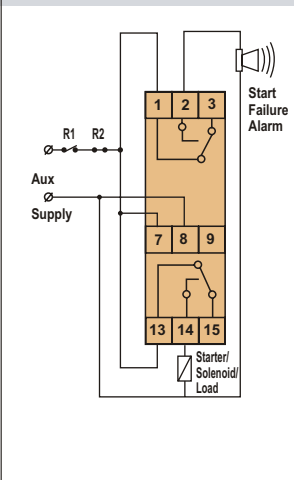
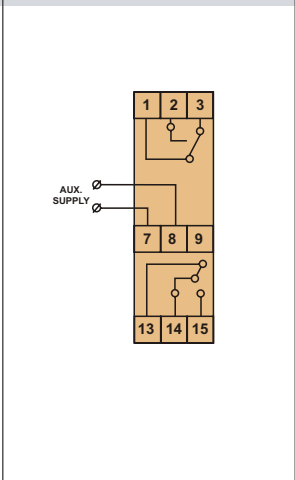
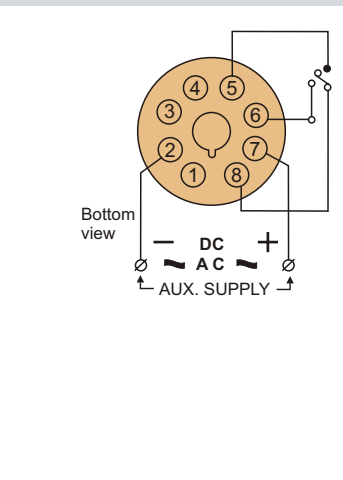
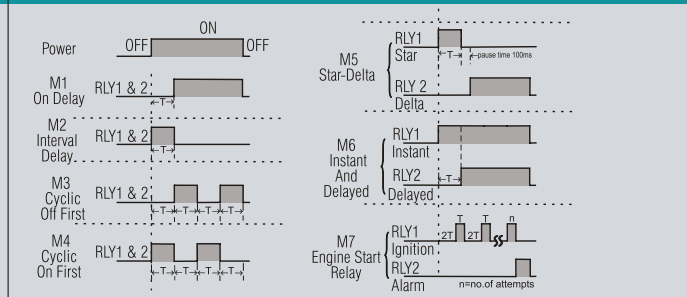
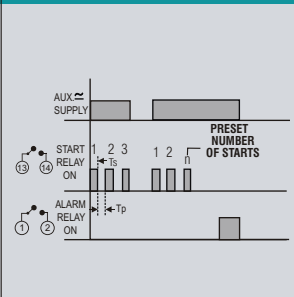
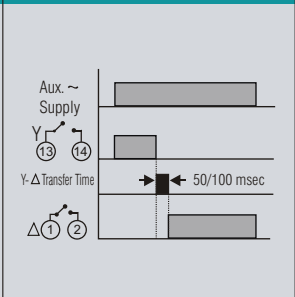
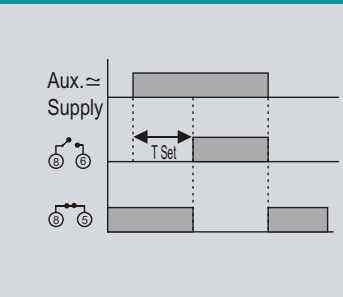


Relay contact position shown in 'Time Elapsed' condition

SPECIAL FUNCTION TIMERS

P1 STM1 On Delay Timer (Minutes)	ESD D1 Star Delta Timer	ESR D1 Multi Attempt Timer	D1 ETM1 Multi Function Timer	S2 ETM1 Multi Function Timer
 <p>On Delay, time range upto 60 minutes, 1 CO output relay</p>	 <p>Star to Delta Changeover timer, Time range upto 60 seconds, 2x1NO output relays</p>	 <p>Generator Engine starting relay, Upto 15 attempts, start time & pause time selectable, 2x1CO output relays</p>	 <p>Microcontroller based Multi-function timer (On delay, interval delay, cyclic, star-delta, Engine starting), time range upto 100 Hrs, 2x1CO output relays</p>	 <p>Microcontroller based, SMD technology Multi-function timer (On delay, interval delay, cyclic, star-delta, Engine starting), time range upto 100 Hrs, 2x1CO output relays</p>

110 / 230 / 380 / V 415 V AC $\pm 10\%$, 12/24 V DC	110 / 240 / 380 / 415 V AC -20% +10% to -20%	110/240 V AC $\pm 20\%$, 50/60 Hz 12 / 24 V DC $\pm 20\%$	*24/110/240/415VAC, $\pm 20\%$, 12/24 VDC	*24/110/240/415VAC, $\pm 20\%$, 12/24 VDC
1 CO	1 NO-Star relay (NO) 1 NO-Delta relay (NO)	1 CO + 1 CO	1 CO + 1 CO	1 CO + 1 CO
0-3, 0-10, 0-30, 0-60 mins	0.7 – 60 secs. in 2 diff. ranges	Start Time - 1 - 15 secs Pause Time - 2 - 16 secs.	0.1-1, 1- 10, 6 - 60, 60-600 seconds 0.1- 1, 1-10, 10-100 hours	0.1-1, 1- 10, 6 - 60, 60-600 seconds 0.1- 1, 1-10, 10-100 hours
On Delay	Star Delta Changeover Time 50 / 100 m.secs.	Start Attempts - 1 - 15 nos.	M1 - ON Delay M2 - Interval (Selectable By Rotary Switch) M3 - Cyclic Instant M4 - Cyclic Delayed M5 - Star Delta * M6 - Instant & Delayed M7 - Engine Start Mode	M1 - ON Delay M2 - Interval (Selectable By Rotary Switch) M3 - Cyclic Instant M4 - Cyclic Delayed M5 - Star Delta * M6 - Instant & Delayed M7 - Engine Start Mode
175 gms.	175 gms.	175 gms.	200 gms (Approx.)	150 gms (Approx.)
50 x 40 x 80	76 x 30.5 x 117.5	76 x 30.5 x 117.5	76 x 30.5 x 117.5	35 x 90 x 60
8 - pin plug-in	68 centre to centre	68 centre to centre	68 mm centre to centre / 35 mm Rail Mounting	35 mm Rail Mounting
			*CE/CSA Not available for 110VAC models	*CE/CSA Not available for 110VAC models



Relay contact position shown in 'Time Elapsed' condition

Relay position shown in 'Power off' condition

CYCLIC TIMERS



ETR D2 Cyclic Timer



Unequal cyclic function, on time and pause time selectable, 2x1CO output relays

D2 ETR1 Cyclic & Forward-Reverse Timer



Unequal cyclic and forward-reverse functions, on time and pause time selectable, 2x1CO output relays

S2 ETM2 Cyclic & Forward-Reverse Timer



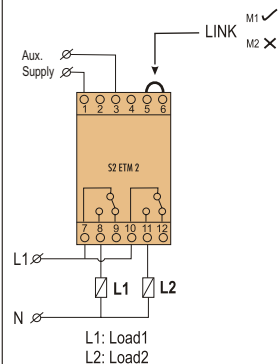
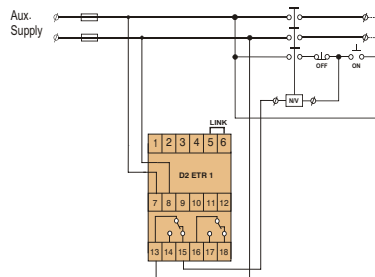
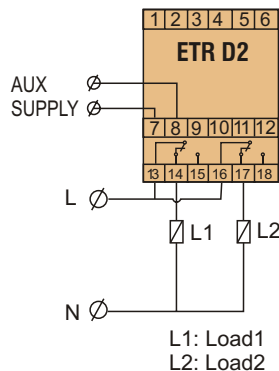
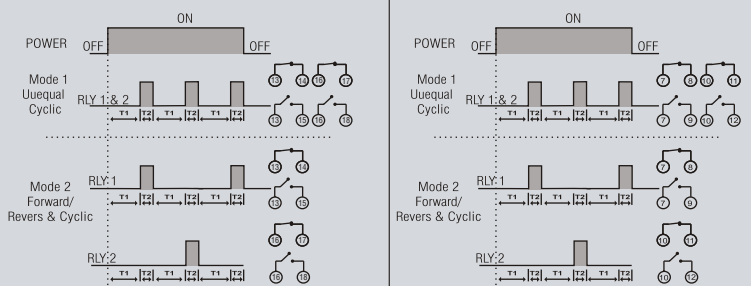
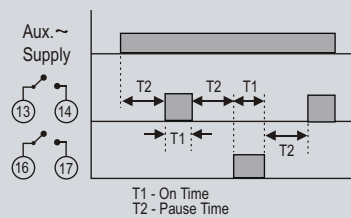
Microcontroller based, SMD technology Unequal cyclic and forward-reverse functions, on time and pause time selectable, 2x1CO output relays

Supply Voltage Auxiliary	110/240/415 V AC $\pm 20\%$ 24 V DC	*24/110/240/415VAC, $\pm 20\%$, 12/24 VDC	*24/110/240/415VAC, $\pm 20\%$, 12/24 VDC
Output Contacts	1 CO + 1 CO	1 CO + 1 CO	1 CO + 1 CO
Time Range	0.7 secs. – 30 mins. in 4 diff. ranges	On Time - 0.1 Sec.To 100 Hrs. Pause Time- 0.1 Sec.To 100 Hrs	On Time- 0.1 Sec.To 100 Hrs. Pause Time- 0.1 Sec.To 100 Hrs
Operating Modes	Forward / Reverse Cycle with pause time	Mode 1 Unequal Cyclic Operation Mode 2 Forward Reverse Cyclic Operation	Mode 1 Unequal Cyclic Operation Mode 2 Forward Reverse Cyclic Operation
Weight	410 gms.	200 gms (Approx.)	100 gms (Approx.)
Dimensions (mm)			
Overall (L x W x D)	76 x 56.5 x 117.5	76 x 56.5 x 117.5	35 x 90 x 60
Mounting (L x W)	67 x 46 / 35 mm Rail Mounting	67 x 46 / 35 mm Rail Mounting	35 mm Rail Mounting

*CE/CSA mark not available for 110VAC models

*CE/CSA mark not available for 110VAC models

Wherever not specified
Contact Rating :
5A @ 230 V AC (resistive)



LIQUID LEVEL CONTROLLERS

LIQUID LEVEL CONTROLLERS

These are suitable for conductive liquids like water and for non-conductive liquids like Diesel/Oil. Models for either one level monitoring or two level monitoring.



MODELS

**WLC D1, Electrodes,
P1 LCW1, P2 LCW1,
S2 WLC1, P2 ALT1
DLC D1 + FRKP 1,
FRKP4**

FEATURES

- Can be used for potable water, water with impurities and for diesel/oil
- Cable size & length no restriction for water level monitoring
- Suitable for variety of electrodes
- Optical sensing for diesel/oil level monitoring
- Open collector output (for FRKP4)
- Choice of enclosures (DIN-Rail, & Plug-in,)
- Models with Micro-Controller based design
- Use of SMD Technology (S2 Series models)

FUNCTIONS

- Level monitoring of conductive and non-conductive liquids
- One level or two level monitoring
- One tank or two tank level monitoring

Ordering Instructions

- ✓ Product Family Name
- ✓ Model Name
- ✓ System Supply Voltage
- ✓ Aux. Supply/Control supply voltage
- ✓ Type of liquid & its specifications

LEVEL CONTROLLERS - CONDUCTIVE LIQUIDS

WLC D1

Water Level Control Relay Two Level Single Tank



Single tank - 2 level control relay, suitable for conductive liquids, sensitivity adjustment, 1CO output relay

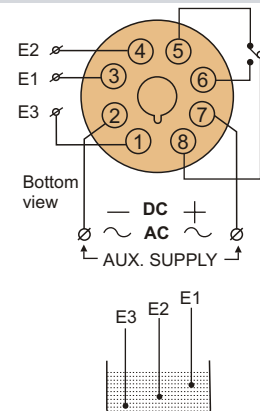
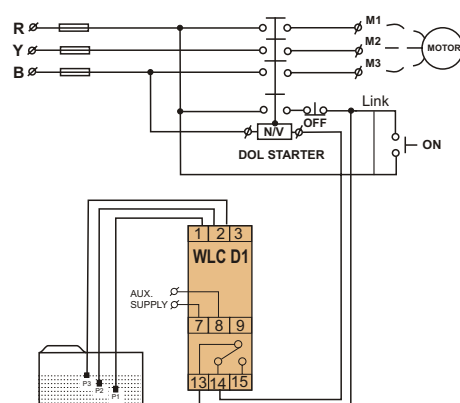
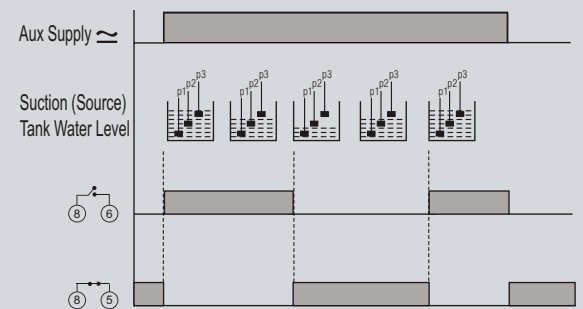
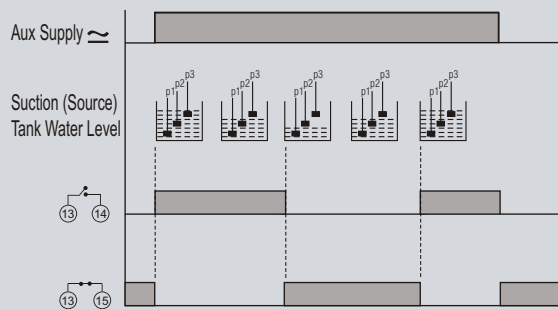
P1 LCW1

Water Level Control Relay Two Level Single Tank



Single tank - 2 level control relay, suitable for conductive liquids, 1CO output relay

Auxiliary Supply	24 / 110 / 240 / 380 / 415 V AC $\pm 10\%$, 50 / 60 Hz, 12 / 24 V DC	24 / 110 / 240 / 380 / 415 V AC $\pm 10\%$, 50 / 60 Hz, 12 / 24 V DC
Output Contacts	1 CO	1 CO
Input Sensors	3 Electrodes	3 Electrodes
Sensitivity	1K Ω - 200 K Ω (adjustable)	N.A.
Trip Time Delay	Less than 1 sec	Less than 1 sec
Weight		
Unit	300 gms.	125 gms
Sensor (each)	50 gms.	50 gms
Dimensions (mm)		
Unit		
Overall (L x W x D)	76 x 30.5 x 117.5	50 x 40 x 80
Mounting (L x W)	68 centre to centre	8 - pin plug-in
Sensor		
Overall	24 (Dia) x 76 (L)	24 (Dia) x 76 (L)



P2 LCW1

Water Level Control Relay Two Level Two Tanks



Two tanks - 2 level control relay, suitable for conductive liquids, 1CO output relay

S2 WLC1



Single tank 2 level control relay, operates on 24 V AC supply, sensitivity adjustment, suitable for conductive liquids, 1CO output relay,

P2 ALT1

Alternating Relay

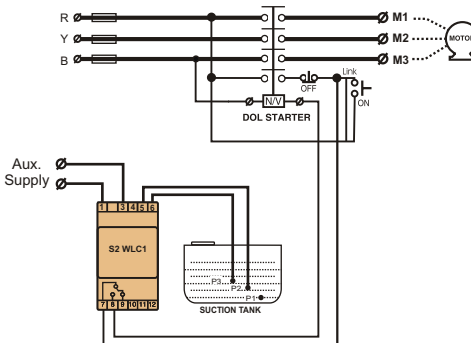
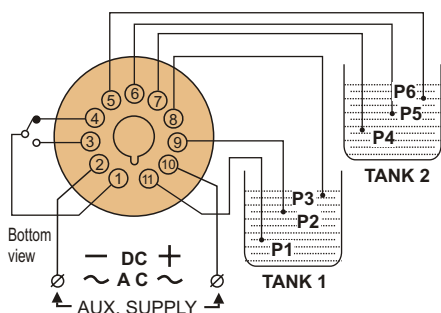
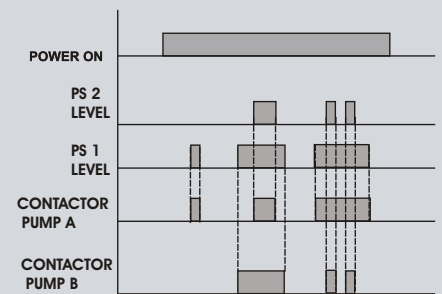
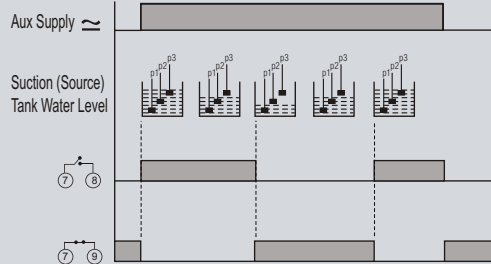
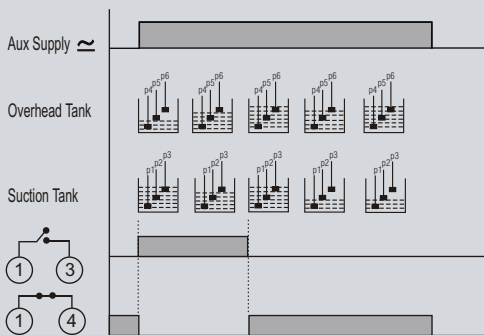


This is a simple 'Step Relay' to achieve alternating duty of two pumps or compressors. Operation of two pumps or compressors is achieved in alternating sequence as per either pressure switch or level control or thermostat contact. Product is available in 11 pin (P2) plug-in enclosure.

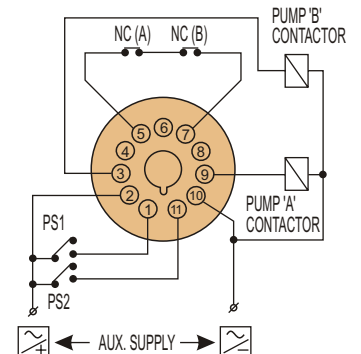
24 / 110 / 240 / 380 / 415 V AC ±10%, 50 / 60 Hz, 12 / 24 V DC
1 CO
6 Electrodes
N.A.
Less than 1 sec
215 gms
50 gms
75 x 35 x 95
11- pin plug-in
24 (Dia) x 76 (L)

24 V AC / DC
1 CO
3 Electrodes
0Ω To 220 KΩ (Continuous)
Less than 1 sec (Fixed)
200 gms.
50 gms.
90 x 35 x 60
35 MM Rail Mounting
24 (Dia) x 76 (L)

Aux Supply	110/220/230/240/380/415 V AC 24 V DC ± 15 %
Frequency	50 Hz / 60 Hz ±3%
Power Consumption	5 VA max.
Output Relay Contact	2 NO
Indication	
ON	Power ON (Green)
RLY	Relay ON (Red)
Operations	30 Operation/Min. (max.)
Dimensions (H x W x D)	85 x 35 x 90mm
Mounting	11 pin plug in base mounting
Weight	250 gms. (approx.)



Wherever not specified Contact Rating : 5A @ 230 V AC (resistive)



Relay position in 'Power on' (Healthy) condition

Relay position shown in 'Power off' condition

LEVEL CONTROLLERS - NONCONDUCTIVE LIQUIDS

DLC D1 + FRKP 1

Diesel Level Control Relay Single Level



One level switch for diesel/oil, optical sensing principle, 1 CO output relay

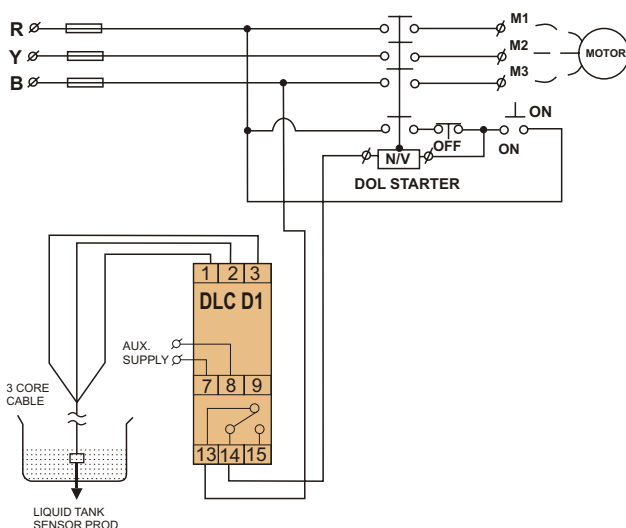
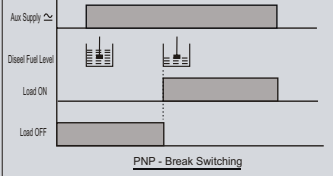
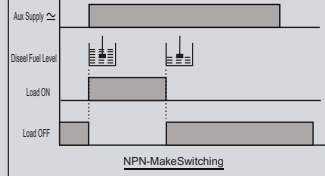
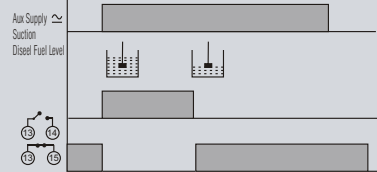
FRKP 4

Diesel Level Sensor Switch Single Level

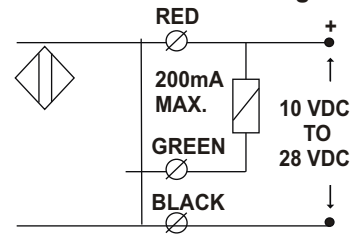


Either high level or low level switch (selectable), open collector output

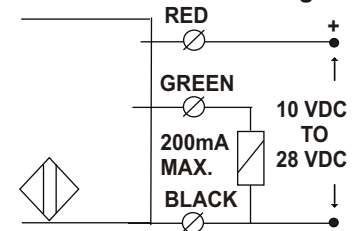
Auxiliary Supply	110 / 230 / 415 V AC / 12 V / 24 V DC / AC	12 V / 24 V DC
Output Contacts	1 CO	Open Collector 400 mA @ 24 V DC
Input Sensors	1 (FRK P1)	Built-in sensor
Sensitivity	N. A.	N. A.
Trip Time Delay	Less than 5 sec	Less than 1 sec
Weight		
Unit	300 gms.	—
Sensor (each)	100 gms.	100 gms
Dimensions (mm)		
Unit		
Overall (L x W x D)	76 x 30.5 x 117.5	—
Mounting (L x W)	68 centre to centre	—
Sensor		
Overall	18 (Dia) x 75 (L)	18 (Dia) x 75 (L)



NPN- Make Switching



PNP- Break Switching



POWER LINE TRANSDUCERS

POWER LINE TRANSDUCERS

Power line transducers are suitable for measuring electrical parameters like AC voltage, current, frequency, PF, KW, KVAR and also for DC signal isolation. They are best suited for MCC and PCC panels, AMF panels, SCADA systems, PLCs for data acquisition and metering.



MODELS

**D2 PTV1, D2 PTC1,
D3 PTF1, D5 PTA1,
D5 PTW1, D5 PTW2,
D3 IST1, D5 IST1**

FEATURES

- Fully solidstate electronic design.
- Rugged to withstand harsh environments
- Load independent outputs
- Galvanically isolated signals
- Accuracy class : 0.5% (Optional 0.2%)
- Self or auxiliary powered.
- CT burden : less than 0.5 VA

FUNCTIONS

- Convert high value AC signal to low value DC signals
- Inputs voltage, current, frequency, power factor, power
- Outputs DC signals single or dual (optionally 3 or 4 for Isolation transducers)

Ordering Instructions

- ✓ Product Family Name
- ✓ Model Name
- ✓ System Supply Voltage
- ✓ Aux. Supply/Control supply voltage

VOLTAGE, CURRENT, FREQUENCY TRANSDUCERS



D2 PTV1
AC Voltage Transducer



Voltage transducer, Input AC voltage, Output (DC) single or dual, accuracy 0.5%

D2 PTC1
AC Current Transducer



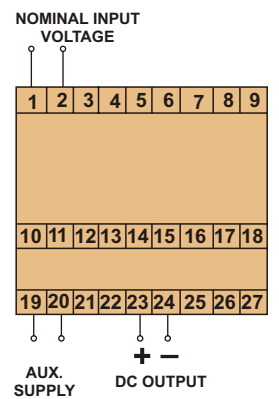
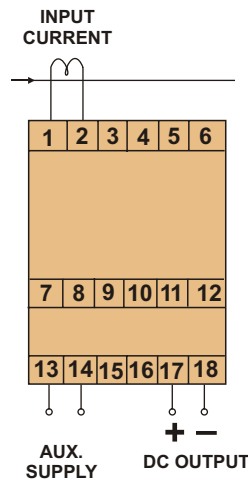
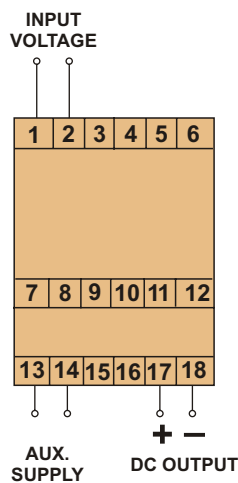
Current transducer, Input AC Current, Output (DC) single or dual, accuracy 0.5%

D3 PTF1
Line Frequency Transducer



Frequency transducer, Output (DC) single or dual, accuracy 0.5%

Auxiliary Supply	110 / 240 V AC, ± 20% 24 / 48 / 110 / 220 V DC ±20%		Self Powered, 110/240 V AC ±20% 24 / 48 / 110 / 220 V DC ±20%
Power Consumption	3.5 VA - AC, 4 VA - DC	3.5 VA - AC, 4 VA - DC	3.5 VA - AC, 4 VA - DC
Input Value I_{in}	N.A.	0 - 1 A AC / 0 - 5 A AC	Freq. Range 45 to 55 Hz / 40 - 60 Hz / 55 - 65 Hz / 48 - 52 Hz
V_{in}	110 / 240 / 415 V	N.A.	110 / 415 V
DC Output (Single / Dual)	0 - 1 mA, 0 - 5 mA, 0 - 10 mA, 0 - 20 mA, 4 - 20 mA, 0 - 5 V, 0 - 10 V Other optional on request		
No of Signal Output	Single (Optional Dual Output)	Single (Optional Dual Output)	Single (Optional Dual Output)
Response Time		Less than 500 milliseconds	
Input / Output isolation	Galvanic	Galvanic	Galvanic
Temperature	0°C to + 55°C	0°C to + 55°C	0°C to + 55°C
Humidity	Up to 95% Rh non condensing	Up to 95% Rh non condensing	Up to 95% Rh non condensing
Dimensions (L x W x D) (mm)	75 x 56.5 x 117.5	75 x 56.5 x 117.5	75 x 83.5 x 117.5
Weight	440 gms	440 gms	575 gms



POWER TRANSDUCERS

D5 PTA1

Power Factor Transducer



Power Factor Transducer, Input 3-phase voltage & current, output Single or Dual (DC), Accuracy 0.5%

D5 PTW1

Active Power Transducer



Reactive Power Transducer, Input 3-phase voltage & current, output Single or Dual (DC), Accuracy 0.5%

D5 PTW2

Reactive Power Transducer



Active Power Transducer, Input 3-phase voltage & current, output Single or Dual (DC), Accuracy 0.5%

Self Powered, 110/240 V AC, 24 / 48 / 110 / 220 V DC \pm 20 %

3.5 VA - AC, 4 VA - DC

1 A / 5 A

110 / 415 V

0 - 1 mA, 0 - 5 mA, 0 - 10 mA, 0 - 20 mA, 4 - 20 mA, 0 - 5 V, 0 - 10 V

Single (Optional Dual Output)

Galvanic

0°C to + 55°C

Up to 95% Rh non condensing

73 x 150 x 113

1200 gms.

3.5 VA - AC, 4 VA - DC

1 A / 5 A

110 / 415 V

Single (Optional Dual Output)

Galvanic

0°C to + 55°C

Up to 95% Rh non condensing

73 x 150 x 113

1200 gms.

3.5 VA - AC, 4 VA - DC

1 A / 5 A

110 / 415 V

Single (Optional Dual Output)

Less than 500 milliseconds

Galvanic

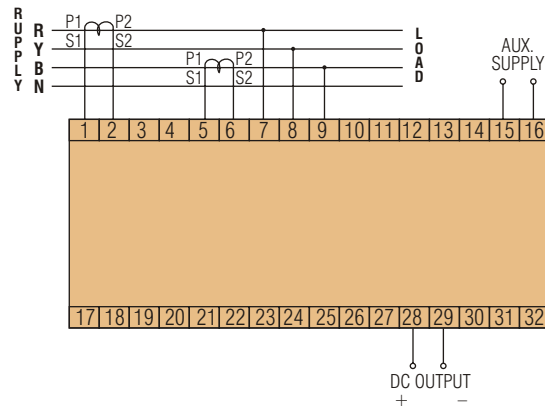
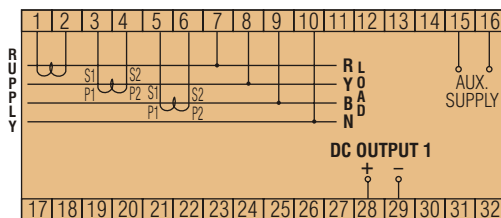
0°C to + 55°C

Up to 95% Rh non condensing

73 x 150 x 113

1200 gms.

For 3 Phase 4 Wire Network



ISOLATION TRANSDUCERS

D3 IST1

DC Signal Isolation Transducer



Signal Isolation transducer, Input & output DC signals, Single or dual outputs, accuracy 0.5%

D5 IST1

DC Signal Isolation Transducer



Signal Isolation transducer, Input & output DC signals, upto 4 outputs, accuracy 0.5%

Auxiliary Supply

Self Powered, 110/240 V AC, 24 / 48 / 110 / 220 V DC \pm 20 %

Power Consumption

3.5 VA - AC, 4 VA - DC

3.5 VA - AC, 4 VA - DC

Input Value I_{in}
V in

0-1, 0-5, 0-10, 0-20, 4-20mADC Signals

0-50, 0-60, 0-75, 0-100 mADC / 0-1, 0-5, 0-10, 0-150, 0-300, 0-600 V DC

DC Output (Single / Dual)

0 - 1 mA, 0 - 5 mA, 0 - 10 mA, 0 - 20 mA, 4 - 20 mA, 0 - 5 V, 0 - 10 V

No of Signal Output

Single (Optional Dual Output)

Single (Optional Dual or 3 or 4)

Response Time

Input / Output isolation

Galvanic

Galvanic

Temperature

0^o C to + 55^o C

0^o C to + 55^o C

Humidity

Up to 95% Rh non condensing

Up to 95% Rh non condensing

Dimensions (L x W x D) (mm)

73 x 83.5 x 117.5

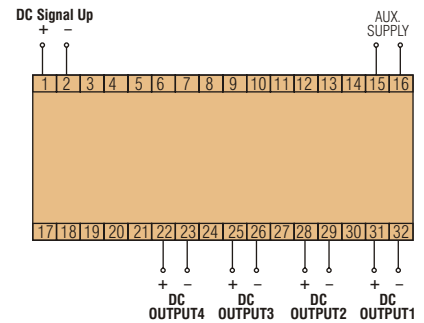
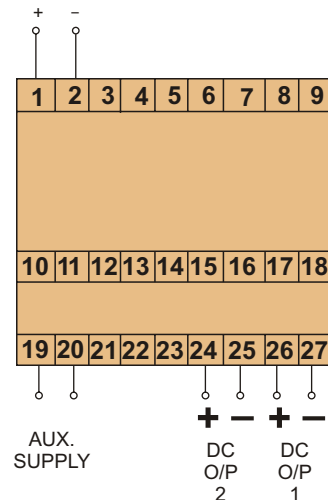
73 x 150 x 113

Weight

1200 gms.

1200 gms.

mA or mV or V
DC Signal Input



AUTOMATION PRODUCTS

AUTOMATION PRODUCTS

Minilec offers variety of controllers for plant/process automation and data logging PLCs with dedicated softwares, Flexible SCADA systems (with hardware) and with communication features, these are easliy adoptable to varying customer needs.



MODELS :
BPC CARD, PPLC,
SCADA Systems -
MINISCADA,

FEATURES

- Digital / Analogue inputs
- Digital outputs
- RS232 / RS485 Serial communication link
- MODBUS ASCII / RTU protocol
- PC side software

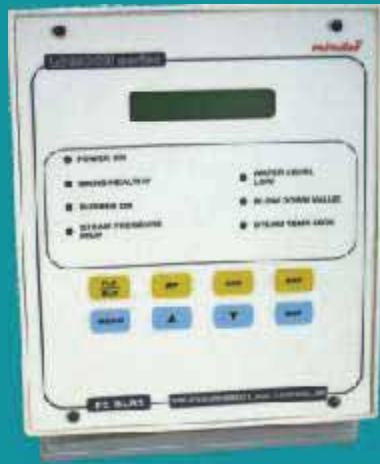
FUNCTIONS

- Continuous monitoring of input parameters
- Control of process through outputs & software
- Data acquisition & communication
- Data Storage & records through PC

Ordering Instructions

- ✓ Product Family Name
- ✓ Model Name
- ✓ Aux. Supply / Control Supply Voltage
- ✓ Input & output details
- ✓ Process / application details

PRE-PROGRAMMED LOGIC CONTROLLER - PPLC

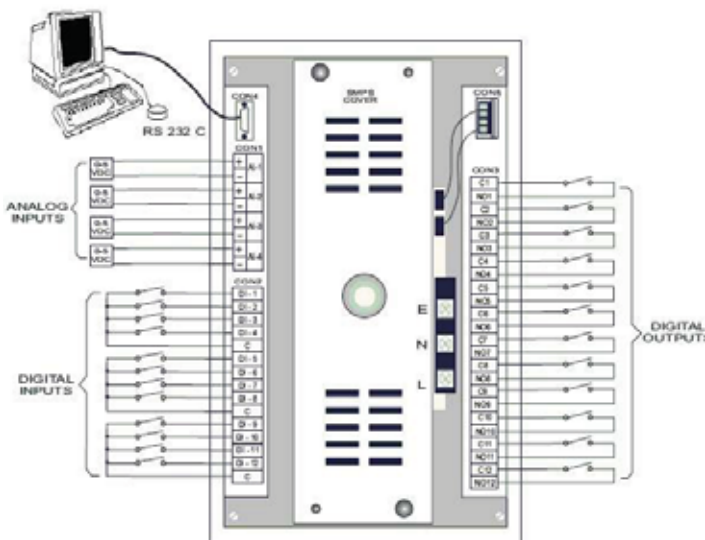
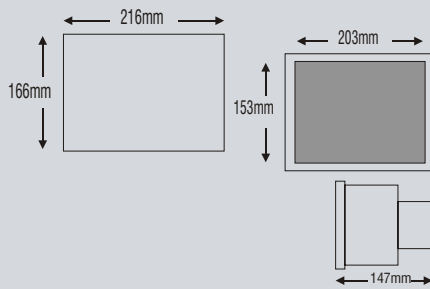


LOGICON SERIES single chip micro-processor custom built dedicated programs as per logic sequence user panel flush mounting facility, 8 way/16 way digital inputs & outputs, built in timers, open collector / relay output key board and display and battery back up.

Auxillary supply	90 - 270 V AC / DC
Input signal (Digital) (Analogue)	12 Numbers 4 Numbers (0 to 5 VDC, Non Isolated) or 2 Nos. (4-20 mA) + 2 Nos (0-5V)
Output signal (Digital)	12 Numbers (NO Contacts) 5 AMP@ 230 VAC (Resistive)
Operating temperature	0-60°C
Dimensions Overall (L x W x D)	166 x 216 x 147mm
Mounting (L x W)	153 x 203mm
Weight	1200gms

Features

- User defined custom - Built operating logic
- Keyboard - 4 Keys - Menu, Up, Down, Enter
- 4 Keys - Function Keys
- Display - LCD display 16x2 char backlit
- Serial communication [RS - 232C]
- Password protection for programming
- Inbuilt buzzer with alarm indication
- Programmable LED indication



Some examples



- F5 PLC2
R/o Plant Controller**
- 8 Digital Inputs
 - 6 Digital Outputs
 - 2 Keys & 13 stage Mimic diagram

- F5 CHL 1
Chiller Plant Controller**
- 7 Digital Inputs
 - 1 Analog Inputs
 - 4 Digital Outputs
 - 6 Keys & LCD Display



- F5 CMP 1
Compressor Plant Controller**
- 8 Digital Inputs
 - 5 Digital Outputs
 - 6 Keys & LCD Display



- F5 BLR 1
Boiler Plant Controller**
- 11 Digital Inputs
 - 2 Analog Inputs
 - 6 Digital Outputs
 - 8 Keys & LCD Display



BOOSTER PUMP CONTROLLER - BPC



Sequencing of Booster Pumps according to the pressure switch, duty cycle is a necessity in a Booster Pump Control System. Minilec Booster Pump Controller Card fulfils all the requirements of a Booster Pump Control Panel. Suitable for 2 / 3 Pumps or 4 / 5 Pumps.

Input :

2, 3, 4,5 Pressure Switches, Over load relay contacts, Water Level Electrodes & Auto / Manual switches

Outputs :

2 Relay outputs for 2 Pump System OR 3 relay outputs for 3 pump System and respectively for 4 & 5 pump systems. Common Alarm Relay output for Buzzer.

Open Collector output :

For LED indications for RUN / Trip on the panel door For LED indications for LL, HL, O / L on the panel door

Operating Sequence:

The key of the Booster Pumps is the Pressure Switches, which are preset according to the different pressure levels in the Pressure Tank. The water pressure in the Pressure Tank is to be maintained so that the consumers get constant pressure irrespective of the variations in the demand. As the user demand increases the respective Pressure switches activate & Booster Pumps are switched ON sequentially.

*Pumps are switched off Sequentially as per decrease in demand. Role of Stand-by pump is rotated in each next cycle to ensure equal running of all pumps.

Technical Specifications :

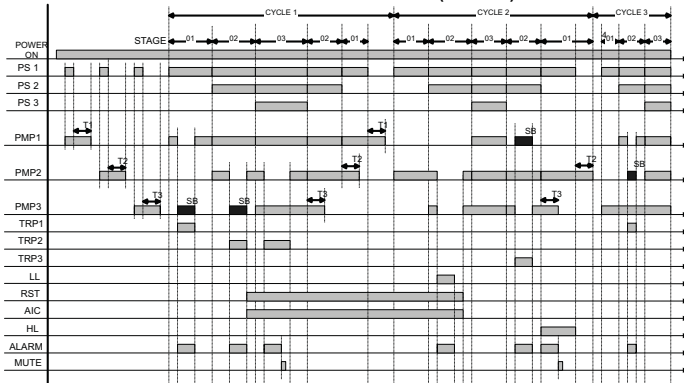
- **Auxiliary Supply Voltage** : 20 V AC \pm 10 %, 50 / 60 Hz \pm 3 %

Inputs	2 Pump System	3 Pumps System	4 Pumps System	5 Pumps System
Pressure Switch Contacts (Potential Free)	2	3	4	5
Trip Contacts (Potential Free)	2	3	4	5
Water Level Inputs (4 Electrodes)	HLL, LL & RST	HLL, LL & RST	HLL, LL & RST	HLL, LL & RST
Auto / Manual Selection Switches (Potential Free)	2	3	4	5
Push Buttons for Alarm Mute (Potential Free)	1	1	1	1
Relay Output				
1) Pump	2	3	4	5
2) Alarm	1	1	1	1
Open Collector Output				
Water Level Control (HL, LL)	2	2	2	2
Pump ON	2	3	4	5
Pump Trip	2	3	4	5
Alarm ON	1	1	1	1
AIC (Alarm Indication (Cancel)	1	1	1	1

Note :

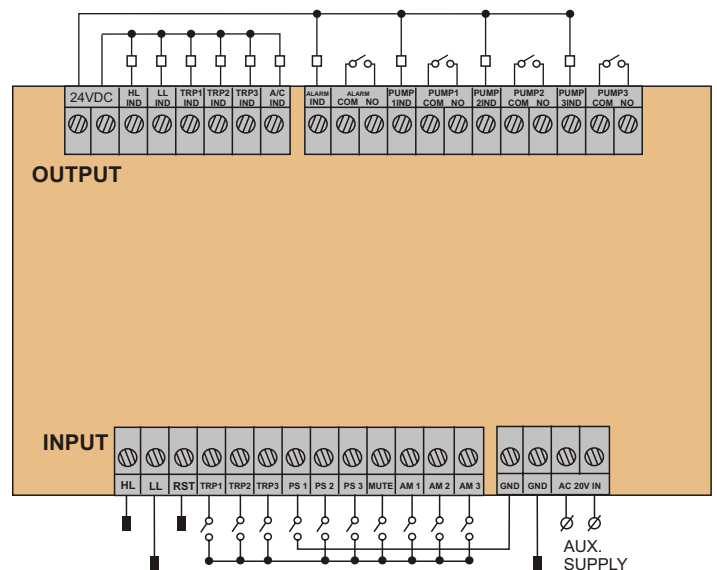
- a) The open collector transistor capacity : 24 V DC, 40 MA b) LED indications are available on BPC for HL, LL, Pump Trip, AIC

BOOSTER PUMP CONTROLLER (3 PUMP) TIMING DIAGRAM



ABBREVIATIONS USED

PS1 : PRESSURE SWITCH1	TRP1 : PUMP1 TRIP	LL : LOW LEVEL	PMP1 : PUMP 1	T1 : OFF DELAY FOR PUMP1 (1-15 SEC)
PS3 : PRESSURE SWITCH3	TRP2 : PUMP2 TRIP	RST : RESTART LEVEL	PMP2 : PUMP 2	T2 : OFF DELAY FOR PUMP2 (1-15 SEC)
PS2 : PRESSURE SWITCH2	TRP3 : PUMP3 TRIP	HL : HIGH LEVEL	PMP3 : PUMP 3	T3 : OFF DELAY FOR PUMP3 (1-15 SEC)
				SB : STANDBY PUMP

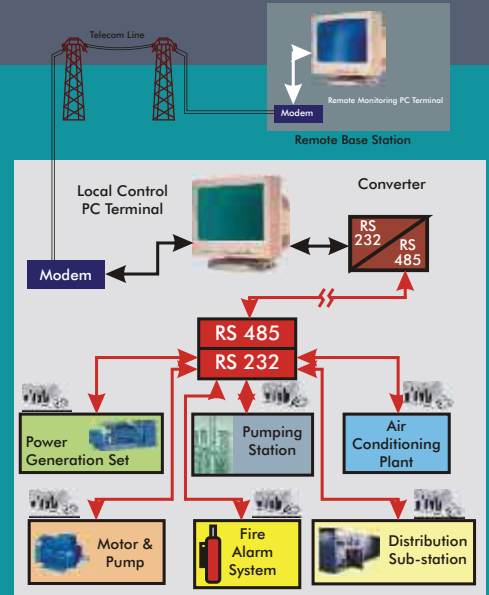


PROCESS / PLANT MONITORING & CONTROL

MINISCADA



SCADA system is useful for Remote Monitoring and control of various equipments used in building or factories or manufacturing plants. Suitable software is developed considering input - output signals & functions



The scheme of Remote Monitoring SCADA System will consist of:

- SCADA hardware-Signal Conditioning & Processing of inputs
- Local LCD display module
- RS 485 port output
- Interface Converter RS 232 - RS485 port and vice versa
- Dedicated Computer Terminals

Application areas

Pump Automation & Remote Monitoring

- Local time based pump operations & remote control function
- Time based event logging.
- Interlinking of multiple pump controllers through RS 485 communication
- Optional Modem base dial up interlinking through PC
- Windows based GUI software

HT / LT Substation Monitoring

- Breaker status monitoring & control
- Winding temperature, gas pressure, oil temperature monitoring
- Digital and analog inputs
- Measurement and remote display of voltage, current, power, battery charger current and voltage.
- Windows based GUI software

Remote Monitoring For Building Facilities

- Customized Solutions for Pump Houses, DG Sets, Mains supply
- Single Source for SCADA Hardware & PC Software
- Secured Access by Passwords
- Event Logging & data analysis
- On Line Reports / Charts
- Supervision & commissioning services

Status Monitoring & Intelligent Control of AC Plants, Power Houses

- Multiple 3 phase Air Conditioning Units
- Multiple Single phase Air Conditioning Units
- Diesel Generator Sets & AMF Control

Standard configuration of MINISCADA has following basic specifications:

Control Supply - 90 - 270 V AC / DC

Digital Inputs - 32 max.

Digital Outputs - 16 max.

Analog Inputs - 6 max.

- Room Temp. - PT 100 / RTD

- DC Current (4-20 mA)

- DC Voltage (0-10 V)

- DC Voltage (0-140 V DC)

- DC Shunt Current (0 - 10 A)

Communication Port - RS 232 / RS 485

Communication Protocol - Modbus ASCII

Keyboard & Display - 4 Keys

16 x 2 alphanumeric Display

Weight - 7200 gms (approx.)

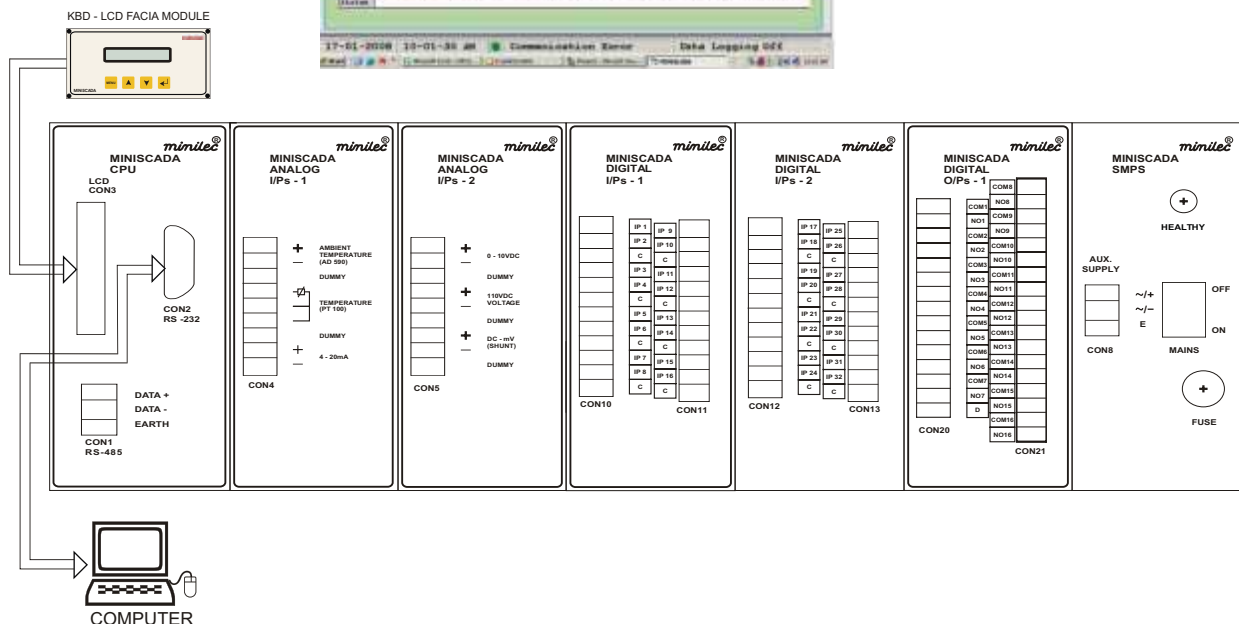
Dimensions (mm) 19" Rack - 3U x 75 HP x 260

(436.88 x 132.50 x 260)

Facia 144 x 72 x 70

(W) (H) (D)

Power Consumption - 30 W max.



ALARM ANNUNCIATORS

ALARM ANNUNCIATORS

Minilec Microprocessor Based Alarm Annunciators are designed to keep an alert & watchful eye on your plant & processes. The entire range has been designed with an insight into the modern day manufacturing plant & its future requirements. Minilec Alarm Annunciators are equipped with microprocessor-based design, super bright LED facia windows, site selectable, programmed sequences as per ISA standard & thoughtful provisions for troubleshooting & maintenance. Dynamic, Alert & Responsive... These unique advantages have helped the Minilec Annunciators to be an icon in the power T & D industry & engineering establishments in India. The world class Minilec Annunciator has made its presence felt in Overseas markets.



MODELS :
MICROWARN 0600,
MBAS 0600,
MBAS 9700,
MBAS 9900,
Accessories,
Annunciation Panels

FEATURES

- 4 windows to 128 windows
- Integral & Split models
- Microprocessor based
- Super bright LEDs for facia
- Standard operating sequences
- Any other custom- made sequences
- NO-NC & Trip Non-Trip site selectable
- Repeat relays
- Supply fail annunciation / Indication
- Choice of 3 window sizes
- Choice of five colours

Ordering Instructions

- ✓ Product Family Name
- ✓ Model Name
- ✓ Aux. Supply / Control supply voltage
- ✓ No. of Inputs (Windows)
- ✓ Operating sequence

ALARM ANNUNCIATORS

ALARM ANNUNCIATORS

The Undisputed Leader

Many pioneering advancements have been introduced for the first time by Minilec in the Indian market. The Minilec range is equipped with well researched and innovative features highly appreciated by consultants and customers (and imitated by competitors!)

Some of the trend setting technologies and features initiated by Minilec are as follows:

Microprocessor based system operation :

- For robust design and easier troubleshooting.
- ISO 9001 standards : For high standards of quality assurance and reliability.
- LEDs for facia : For lower maintenance costs, long life and low energy consumption.
- Multi coloured windows : For simplified fault differentiation.
- Standard modules : For seamless integration and better aesthetics.
- Moulded enclosure : For space savings and improved aesthetics.
- Easily accessible DIP switches : For faster programming by eliminating the need to open the unit.
- Any operating sequence : For added flexibility and convenience.
- Serial communication : For computerised fault detection and automatic documentation.

Solutions for Varying Needs

The Minilec range of annunciators is highly diversified and adaptable to a wide spectrum conditions. Be it a Power station, Sub station, Sugar factory, Steel plant, Fertiliser / Petrochemical plant, ships and dockyards, railways or for that matter, any process plant. Be it in the hot summers of Rajasthan, Egypt of Indonesia or the humid atmosphere of Clacutta, Chennai or Malaysia, Minilec takes it all in its stride !

The Product Range

MICROWARN 0600 - Standard models for 6,8,12 points

MBAS 0600 - Standard models for 4-16 points

MBAS 9700 - Standard models for 16, 32, 48, 64, 80, 96 point

MBAS 9900 - Standard models for 4, 6 & 8 points

The Advant -edges

Advantages of Microprocesor Based Alarm Annunciators over solid state version

- Less components hence high reliability.
- Compact size, light weight.
- Low power consumption.

- Flexibility - any operating sequence can be provided.
- Being the latest in technology, can be configured easily with any other advanced system.

The Unique Features

- Powerful microprocessor based circuit.
- Built in system watch dog.
- First fault identification.
- Optically isolated fault inputs.
- Wide range of site selectable alarm sequences (ISA standards)
- Facia with super bright LEDs instead of high power consuming short life filament lamps.
- Site selectable fault contact filament lamps. Site selectable fault contact configuration (NO/NC).
- Special SMPS power supply.
- Sleek, modern, aesthetic design.

Additional Features

- Grouping feature for differentiation between Trip / Non - Trip type faults.
- Repeat relays for parallel annunciation.
- Supply fail annunciation / indication.
- Manned / Unmanned feature.
- Paralleling of units.
- Group fault alarm.
- Choice of three window colours : Red, Green, Amber (Yellow).

Reliability

Minilec annunciators have been tested satisfactorily at CPRI (Bangalore), SISIR Singapore, ERTL, ETDC for environmental and functional tests as per relevant standards.

Upon request available with CE marking.

All Alarm Annunciator carry 5 yrs. warrantee.

The Highlights

- MBAS series with replaceable windows, 2 window sizes, DIP switches outside for easy programming
- Common power supply 90-270 AC/DC and DIP switches outside for Microwarn 0600 models.
- Split architecture - economic/cost saving, for 19" rack concept for MBAS 9700 models.
- Serial port - RS232C / RS485 for MBAS 9700 models.



MICROWARN 0600



12 Windows Model



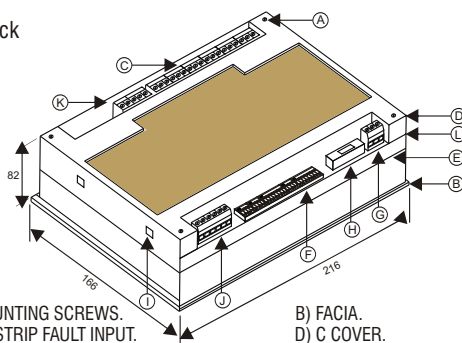
8 Windows Model with push button

Now with Reduced depth

This is a modified version of earlier Microwarn 9600 model which has been discontinued. Microwarn 0600 consists of 3 basic sections :

Microwarn 0600 is now more compact than before with reduced depth. Also it can have 3 rd output relas for extra function

- (A) The Power Pack
- (B) The CPU
- (C) The Facia,



NOTES :-

- A) COVER MOUNTING SCREWS.
- B) FACIA.
- C) TERMINAL STRIP FAULT INPUT.
- D) C COVER.
- E) LED BOARD.
- F) DIP SWITCH.
- G) POWER SUPPLY CONNECTOR.
- H) FUSE.
- I) SLOT FOR MOUNTING CLAMP.
- J) RELAY OUTPUT.
- K) TERMINAL FOR EXTERNAL PUSH BUTTON.
- L) SMPS + CPU CARD.

TECHNICAL SPECIFICATIONS :

Supply Voltage	24/30/48/ V DC 90-270V AC/DC +10% -15%
Windows	12/8/6
Window Sizes	45 x 45 mm
Display Device	Super bright high efficiency low power consuming LED's
Facia Type	Front Replaceable
Window/LED Colour	Standard colour available RED, Optional colours Yellow / Amber, Green
Flash Rate	Fast - 60 flashes/min. Slow - 30 flashes/min.
Response Time	25 msec. ± 10 msec.
Input Signal	Potential free contacts (NO or NC site selectable)
Interrogation Voltage	+ 12 V DC
Output Contacts	1 NO + 1 NO (optional) + 1 NO (Optional)
Architecture	Integrated
Operational Seq.	ISA Standards sequences - Auto/Manual/First-up/Ringback (optional) OR any other sequence on request
Operational Temp.	0-60°C
Power Consumption	1.5 Watts per Window (Max.)
Optional	Grouping / AC-DC fail Annunciation
Dimensions (mm)	
Panel Cutout (L x W)	153 x 203
Overall (L x W x D)	166 x 216 x 82

Wherever not specified Contact Rating : 5A @ 230 V AC (resistive) * CE marked products available on request.

A) The Power Pack :

The Microwarn 0600 is powered by a highly reliable and noise free, specially designed power supply. It converts the available power source (AC/DC voltage supply) into a regulated and filtered DC output, which is fed to the annunciator unit.

B) The CPU :

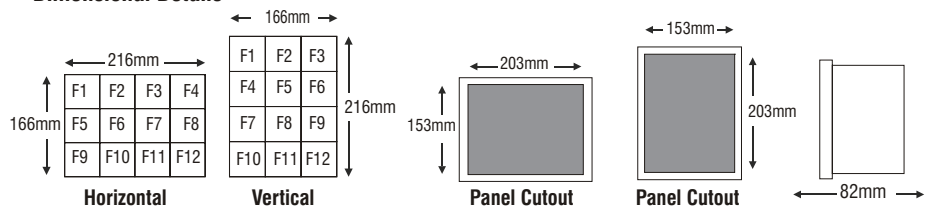
This is the Central Processing Unit of Microwarn 0600 which scans and processes the incoming fault signals from the various potential free field contacts and drives the corresponding LED windows and the audible devices in order to announce the fault, according to the operating sequence selected.

C) The Facia :

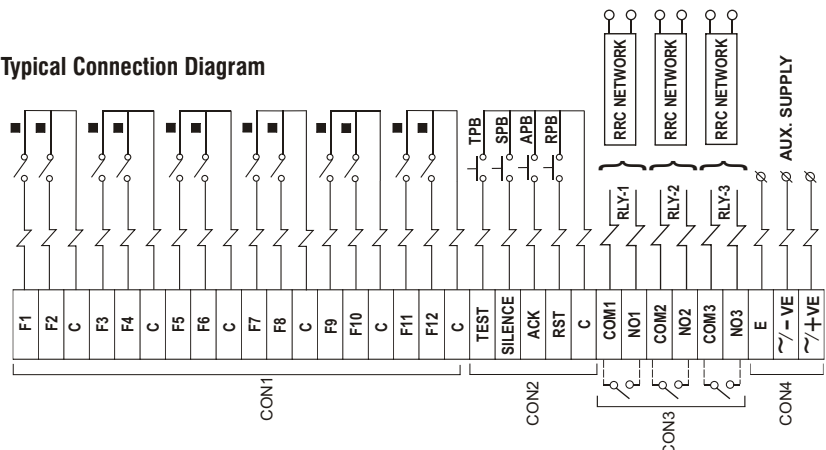
This section consists of facia windows illuminated by "Super Bright LEDs" on occurrence of any fault. The Super Bright LEDs ensure a long and absolutely maintenance free window life along with a good visibility, and have very low power consumption.

NO/NC or sequence selection DIP switches are located outside, hence programming is now possible without opening the unit. Models of 12, 8, 6 windows are available. 8 and 6 window models are with built-in push buttons.

Dimensional Details



Typical Connection Diagram



ALARM ANNUNCIATORS

MBAS 0600



MBAS 0600 is a improved version of earlier MBAS 9400, and is available for 4 to 24 windows

The Functional Features

- Fixed Sequence (S1/S2/S3/S4)
- Sequence as per ISA standard
- Potential free dry contact inputs
- NO/NC inputs grouping selectable configuration
- Relay output for external Audible Hooter
- 3rd Relay optional for either of below mentioned features
 - a) Ring back hooter
 - b) Supervisory control

The Design Features

- Single chip microcontroller logic
- Opto isolated inputs and outputs
- Super Bright LED window illumination
- High Noise immunity / isolation
- Switch mode power supply
- Self surveillance watchdog LED

The Constructional Flexibility

- Conforming to DIN panel cutouts
- Replacable snap-on window capsules
- Two different window size
- Expandable modules
- Moulded enclosures

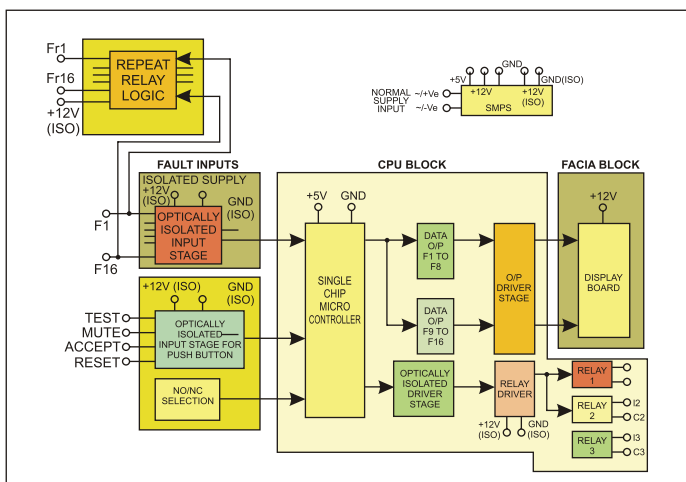
System Enclosures

The MBAS 0600 annunciation systems is configured in multiples of four basic ABS moulded enclosures



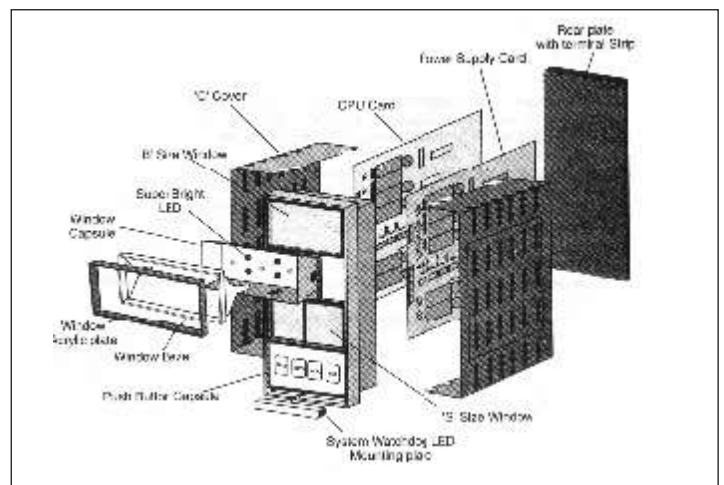
Basic Standard Enclosures

Functional Block Diagram



Back view showing Terminal details

Part names & locations



Optional Features

- Site Selectable sequences (S1, S2, S3, S4)
- Pre-programmed Custom built operating sequences
- Trip & Non-Trip grouping facility for MBAS 0600
- Manned / Unmanned function
- Fault Follower contact output per fault Input (NO or NC)
- Ringback sequence with optional 3rd relay output for Ringback hooter, with Trip & Non-Trip grouping facility
- Supply fail indication / annunciation
- External and / or built-in control push buttons

MBAS 0600



3D



312B0S00

4D

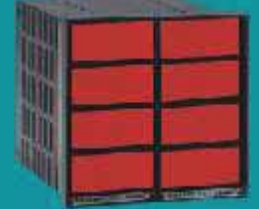


30B24S00



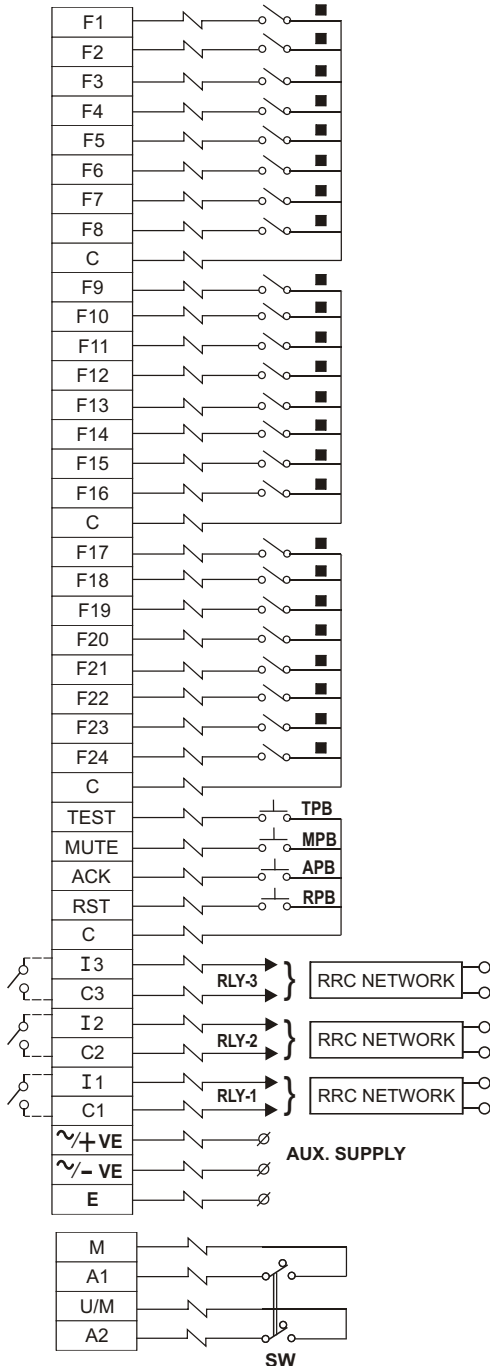
416B0S00

2D



28B0S00

Connection Diagram (FOR MAX. 24 POINT MBAS 0600.)

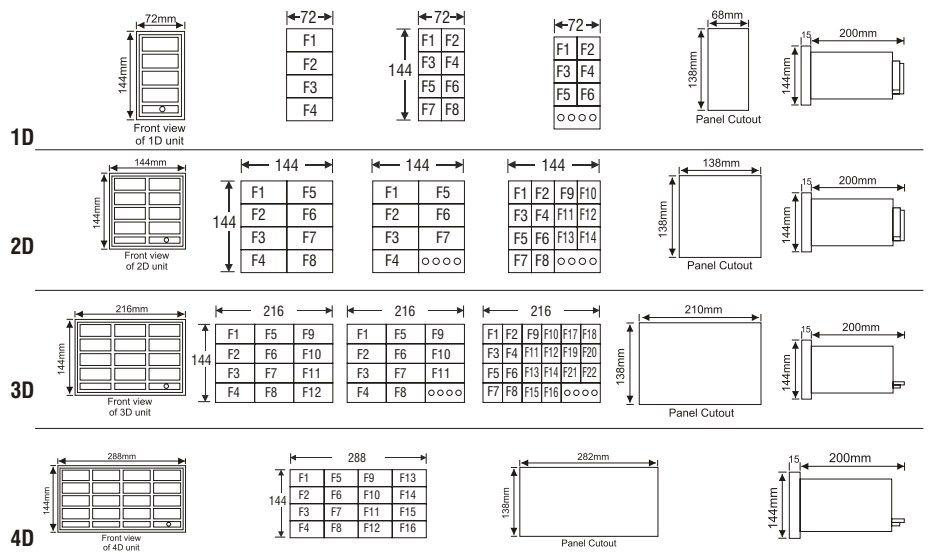


TECHNICAL SPECIFICATIONS :

Supply Voltage	24 / 30 / 48 / V DC 90 - 270 V AC / DC				
Windows	4 / 6 / 8 / 12 / 16 / 18 / 22 / 24				
Window Sizes	30 x 30mm / 30 x 65 mm				
Display Device	Super bright high efficiency low power consuming LED's				
Facia Type	Individual windows front Individual windows / Front Replaceable				
Window/LED Colour	Standard colour available RED, Optional colours Yellow / Amber, Green				
Flash Rate	Fast - 60 flashes/min. Slow - 30 flashes/min.				
Response Time	25 msec. ± 10 msec.				
Input Signal	Potential free contacts (NO or NC site selectable)				
Interrogation Voltage	+ 12 V DC				
Output Contacts	1 NO + 1 NO (Optional) + INO (optional)				
Architecture	Integrated				
Operational Seq.	ISA Standards sequences - Auto/Manual/First-up/Ringback (optional) OR any other sequence on request				
Operational Temp.	0-60 degrees C				
Power Consumption	1.5 Watts per Window (Max)				
Optional	Grouping / AC-DC fail Annunciation / Repeat Relay cards				
Dimensions (mm)	1D	2D	3D	4D	
	Panel Cutout (L x W)	138 x 68	138 x 138	138 x 210	138 x 282
	Overall L x W x D	144 x 72 x 215	144 x 144 x 215	144 x 216 x 215	144 x 288 x 215

Wherever not specified Contact Rating : 5A @ 230 V AC (resistive) * CE marked products available on request.

Dimensional & Panel Cutout Details



ALARM ANNUNCIATORS

MBAS 9700



Integral Model : 16 Pts. Small



Integral Model : 16 Pts. Big

STANDARD FEATURES

- Single chip micro-controller logic.
- Super bright LED's for window illumination.
- Site selectable NO/NC type fault contacts.
- Site selectable trip /Non trip (Grouping).
- Easy card replacement & hence fault diagnosis.
- Switch Mode Power Supply. (Suitable for Both AC/DC Supply)
- High noise immunity and wide input supply variation.
- Opto-isolated Inputs and Outputs.
- Site Selectable sequences.
- Potential free dry input contacts.
- Two different window sizes.
- Replaceable windows & window legends.
- Computer linking for fault logging with printer facility for report.
- Self-surveillance watch dog LED.
- Relay output for external audible hooter.
- Diagnostics Menu
- Redundant Power Supply (Only in 19" Rack Model)
- CPU fail & PSU fail indication with relay output contact (Only in 19" Rack)
- User Friendly terminal Connectors

CONSTRUCTIONAL DETAILS

MBAS 9700 consist of four basic sections (in 16 point moulded enclosure these are inbuilt)

- 1) The Power Supply Unit (PSU Module).
- 2) The Main Control Unit (CPU + IOU Module).
- 3) The Display Facia Unit (DFU Module).
- 4) Computer interface.

THE MAIN CONTROL UNIT (MCU)

CPU module is the Main Processing Unit of MBAS 9700 which scans and processes the incoming fault signals from the various potential free field contacts through IOU module, and drives the corresponding LED windows and the audible device in order to annunciate the fault through IOU module. The IOU module is the input & output interfacing unit. To each IOU module 16 input contacts (potential free) & 16 window LED's can be connected.

MINILEC

offers its unique alarm

Annunciator based on the latest single chip micro-controller technology with serial communication facility. Now available in both 19" rack type enclosure as well as in moulded enclosure. MBAS 9700 annunciators have split architecture for 16, 24, 32, 48, 64, 80, 96, 112 & 128 windows and integral type of architecture for 16 small or big window models. 24, 32, 48, 64, 80, 96, 112, & 128 window models are housed in 19" rack type enclosures, separate for MCU & for PSU. Here choice of facia (DFU) is of 3 types (a) Small size i.e. 30 x 30 mm and (b) Big size is 30 x 65 mm / 50 x 70 mm. (c) Facia is available in multiples of 16 windows. In addition to all other standard features, MBAS 9700 has additional facility of computer linking. A serial port (RS232C /RS485) output is available which can be supported by an IBM compatible PC of minimum 386 configuration. Minilec can supply the standard software with every model or can develop suitable software as per customer requirements or can provide source coding / protocol details to enable client to develop their own suitable software.

THE POWER SUPPLY UNIT (PSU)

PSU converts the available power source into a regulated and filtered DC output, which is fed to the MCU Module & DFUs. The power supply can accept Specified AC or DC I/P supply, depending upon the application.

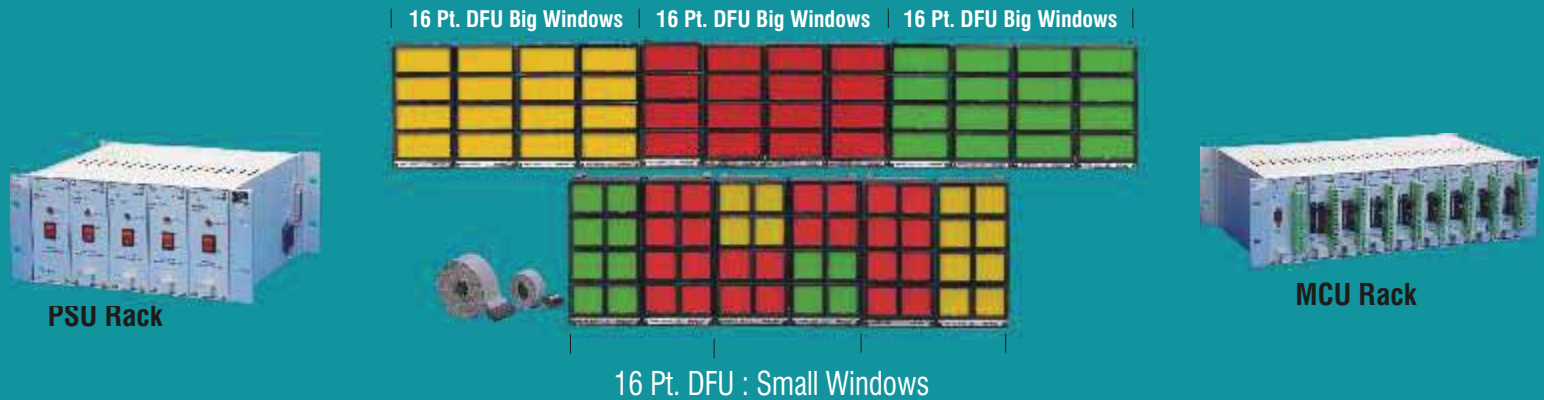
OPTIONAL FEATURES

- Different colored LED's in each window for easy differentiation of critical faults.
- Customized preprogrammed operating sequence.
- Multi channel serial communication (8 Annunciators & single computer)

THE DISPLAY FACIA UNIT (DFU)

The Facia block is accessible from front (in moulded enclosure) and constitutes of window capsules. The sandwiched photo film window inscriptions are press fitted on the window capsules. For 16 to 128 points system the DFUs are given separately, except 16 point (moulded Enclosure) where it is in built.

MBAS 9700

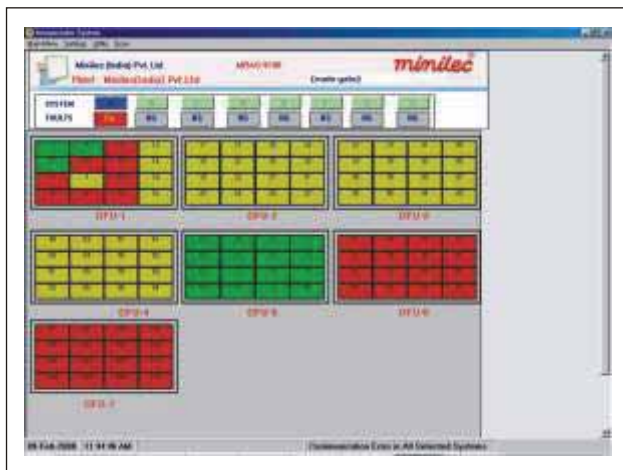


COMPUTER INTERFACE

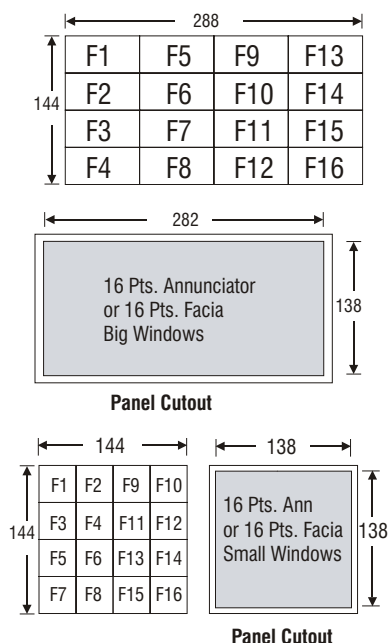
The MCU unit transmits fault information to computer serially. RS 232C/RS 485 standard is used for serial communication. Communication protocol modbus ASCII / RTU can be offered. In computer user-friendly software is written. This software offers on-line Date & Time setting, Legend setting, Display window & also it gives fault report with on demand printing facility.

TECHNICAL SPECIFICATIONS:

1.0	Supply voltage	20 - 60VDC, 90 - 270VAC/DC
2.0	Supply frequency	50 / 60 Hz. (±3%) for AC
3.0	Input	
3.1	Fault Alarm Inputs.	Actuation Through Fault Contacts
3.2	Fault contacts.	Potential free (voltage free) type
3.3	Input interrogation voltage	+12V DC (ISO)
3.4	Input isolation	Opto isolating device. (2 KV)
3.5	Response Time	40 mS.
3.6	Site selectable DIP for	
	Fault type	NO/NC
	Grouping	Trip/Non Trip
	Sequence selection	Manual/Auto/Ringback/Firstup
4.0	Output	
4.1	Output contacts for grouping	1NO+ 1NO
4.2	Output contact for CPU & PSU fail	1NC (In 19" Rack Only)
4.3	Contact Rating	5 amp at 240 VCA (Resistive)
5.0	No. of windows	
	In 19" rack	16/24 Big/32/40 Big/48/64/80/96/112/128
	In 9400 enclosure	16 points
5.1	Windows dimensions	30 mm x 30 mm For small windows 65 mm x 30 mm For big windows
5.2	Colour	Red / (Yellow {Amber}) / Green
5.3	Flash rates	50-60 flashes / Min 25-30 flashes / Min. For Ring Back Sequence or other seq.
5.4	Power Consumption	1.5 W per Window. (Max)
6.0	Sequence	Manual Reset, Auto Reset, Ring back, Firstup (Any Other Sequences On Request)
7.0	Serial communication	RS232C / RS485 with modbus ASCII / RTU

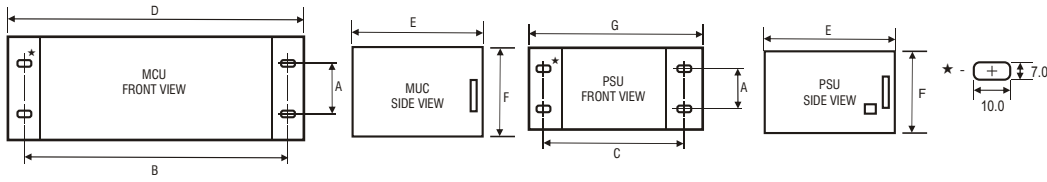


Dimensional Details for Facia



ALARM ANNUNCIATORS - MBAS 9700

DIMENSIONAL DETAILS - MCU & PSU

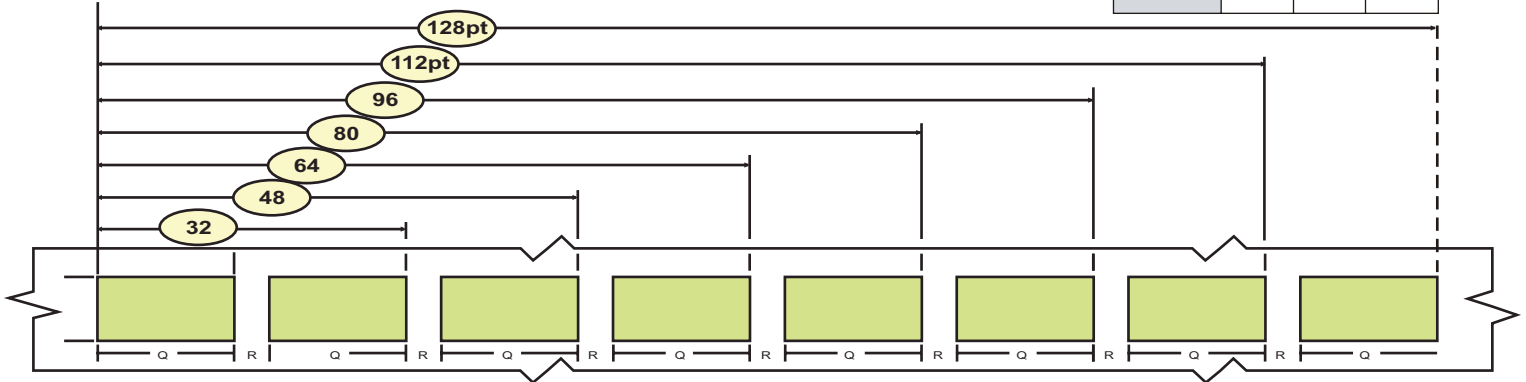


MODELS	MOUNTING DIMENSIONS			OVERALL DIMENSIONS			
	A	B	C	D	E	F	G
128 POINTS	57.15	465.10	292.38	482.60	260.00	132.50	310.38
112 POINTS	57.15	419.38	292.38	436.88	260.00	132.50	310.38
96 POINTS	57.15	373.66	241.58	391.16	260.00	132.50	259.58
80 POINTS	57.15	327.94	241.58	345.44	260.00	132.50	259.58
64 POINTS	57.15	434.62	-----	452.12	260.00	132.50	-----
48 POINTS	57.15	388.90	-----	406.40	260.00	132.50	-----
32 POINTS	57.15	292.38	-----	309.88	260.00	132.50	-----

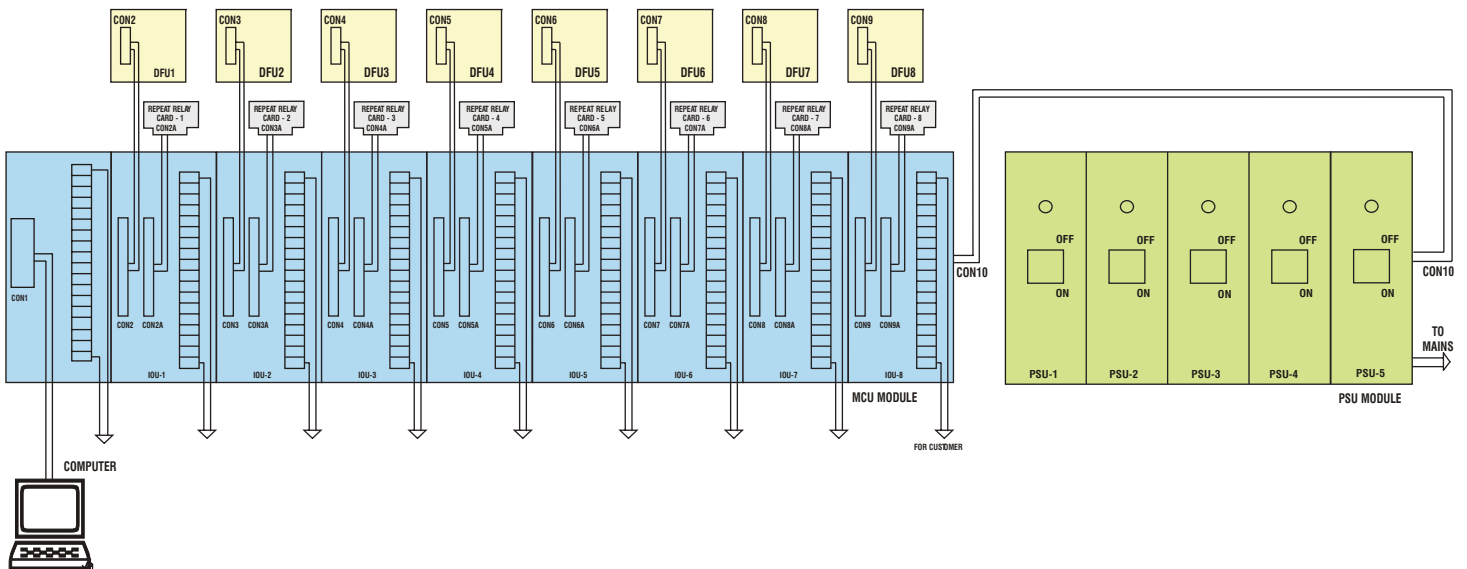
Overall Dimensions (DFU)

MODELS	Big Windows		
	W	L	D
128 POINT	144m.m.	2304m.m.	70m.m.
112 POINT	144m.m.	2016m.m.	70m.m.
96 POINT	144m.m.	1728m.m.	70m.m.
80 POINT	144m.m.	1440m.m.	70m.m.
64 POINT	144m.m.	1152m.m.	70m.m.
48 POINT	144m.m.	864m.m.	70m.m.
32 POINT	144m.m.	576m.m.	70m.m.
	Small Windows		
128 POINT	144m.m.	1152m.m.	70m.m.
112 POINT	144m.m.	1008m.m.	70m.m.
96 POINT	144m.m.	864m.m.	70m.m.
80 POINT	144m.m.	720m.m.	70m.m.
64 POINT	144m.m.	576m.m.	70m.m.
48 POINT	144m.m.	432m.m.	70m.m.
32 POINT	144m.m.	288m.m.	70m.m.

PANEL CUTOUT DETAILS - DFU



EXTERNAL WIRING DIAGRAM WITH REPEAT RELAY



ALARM ANNUNCIATORS

MBAS 9900



1 OB 6S PB

1 OB 4S PB

MBAS 9900 screens Annunciator accepts 12 / 24 V DC potential input & also provides control relay output. Added built-in buzzer & push buttons makes it complete Annunciator with control output. This output is interlocked until all fault input resets. MBAS 9900 is presently available in 4 point & 6 point small window (30 x 30mm) configuration. Both 4 point & 6 point systems come with built-in push buttons.

Technical Specifications :

PARAMETERS	
Supply Voltage	230 V AC / 110 V AC, 12 V / 24 V DC +10% -15%
Windows	4 / 6 / 8
Window Sizes	30 x 30 mm
Display Device	Super bright LED's
Facia Type	Individual Windows Front Replaceable
Window/LED Colour	RED, Yellow / Amber, Green
Flash Rate	Fast - 60 flashes/min. Slow - 30 flashes/min.
Response Time	25 msec. ± 10 msec.
Input Signal	+12 V or 24 V DC Contact
Output Contacts	1 CO + 1 CO
Architecture	Integrated
Operational Seq.	Sequence as mentioned in text
Operational Temp.	0-60°C
Power Consumption	1.5 Watts per Window

Wherever not specified Contact Rating : 5A @ 230 V AC (resistive)

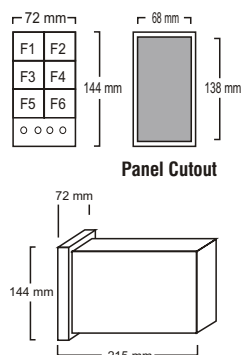
Operating sequence table - MBAS 9900

MANUAL ACTION	N	ABN	RN	R-ABN	N	ABN	N	ABN	R-N	R-ABN	N	ABN
P.B. TEST												
DEP												
REL												
VISUAL AUDIO(N)	F ON	OFF OFF	F ON	OFF OFF	F ON	N. A. N. A.	F OFF	N. A. N. A.	S OFF	S OFF	OFF OFF	F ON

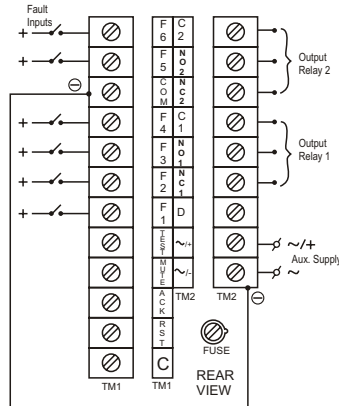
ABBREVIATIONS :

N	NORMAL	AUDIO(N)	S STEADY ON
ABN	ABNORMAL	DEP.	NORMAL BUZZER
RN.	RETURN TO NORMAL	REL.	DEPRESSED
RABNS	RETURN TO ABNORMAL	N.A.	RELEASED
		F	NOT APPLICABLE
			FLASH

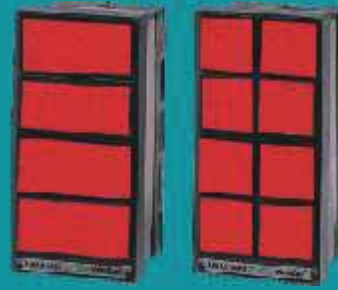
Dimensional Details



Connection Diagram



MICROFACIA



MF951

MF955

These are LED Facia windows with Potential input or potential free input. Microfacia is available in either 4 Big or 8 Small windows size. Standard models available for 12V/24V DC and 110V/230V AC.

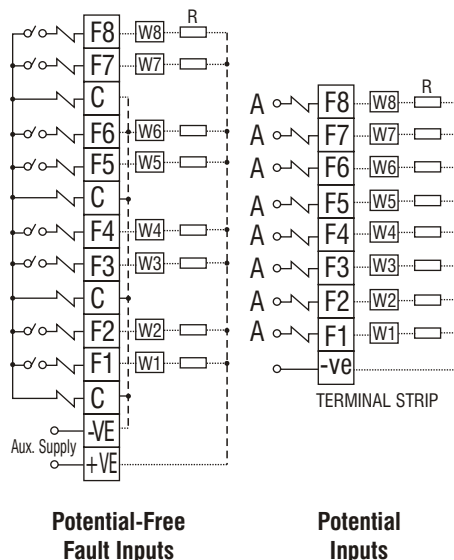
Microfacia are LED window assemblies for RUN, TRIP or FAULT indications. With microfacia windows the panel designers can improve aesthetic value to the panel indications in a Row / Column format. Microfacia is useful for direct operation with AC or DC voltage

Technical Specifications :

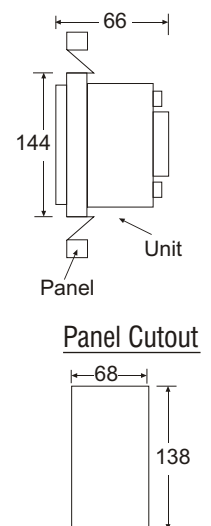
PARAMETERS	
Auxiliary Supply *	12 / 24 / 110 / 220 V AC / DC
Input	Potential Free Contacts or Potential Contact
Output	Window Facia LEDs on front
Window /LED Colour	RED, Amber / Yellow, Green
Power Consumption	1.5 Watts per Window
Dimensions (mm) Unit	Overall (L x W x D) (w/o PSU) 144 x 72 x 80 (With PSU) 144 x 72 x 215
Dimensions (mm)Window	for Small 30 x 30, for Big 62 x 30
Weight (Approx.)	700 gms. (With PSU) 250 gms. (W/o PSU)

* Applicable only for Microfacia with potential free inputs.

Connection Diagram



Dimensions



ALARM ANNUNCIATORS

ANNUNCIATOR PANELS



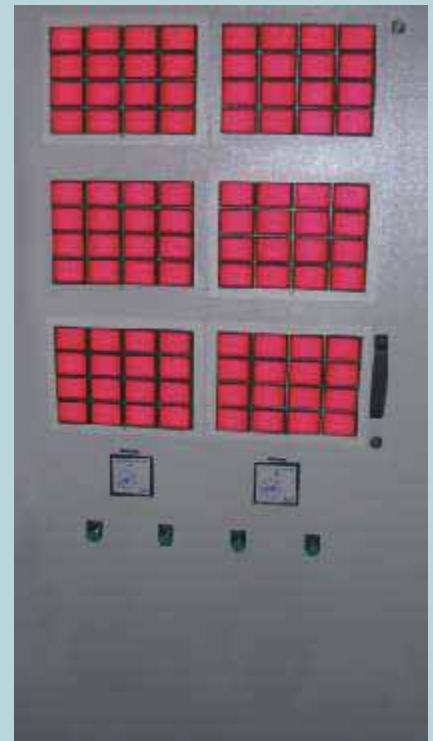
Often Alarm Annunciators are required assembled housed in a suitable control cubical. The control panel consists of only Alarm Annunciators.

Minilec offers Alarm Annunciators along with control panels. This includes design of control panel, fabrication, painting, assembly of Alarm Annunciators and assistance during installation and commissioning.

Retrofitting work by replacing old annunciation system with latest design and for expansion in power stations, substations, process plants as also standard Annunciation Panels for plants and equipments can be catered to.

The Minilec Panel Advantages

- Complete in-house design, assembly of Annunciator Panels.
- Software capability for automisation to meet project specifications.
- Component layout as per standards & safety requirements.
- Powder coated MS or Aluminum Rack Panels with quality panel wiring.

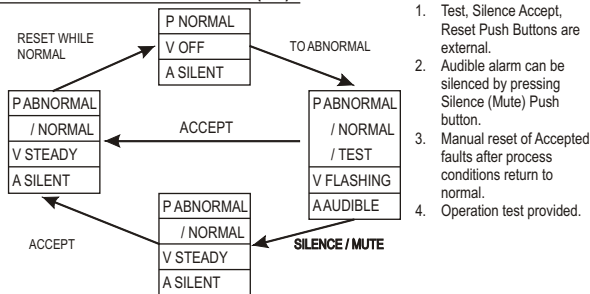


STANDARD OPERATING SEQUENCES

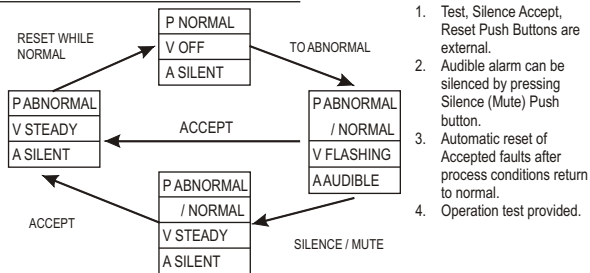
The MINILEC Annunciation systems are programmed to operate as per following operating sequences conforming to ISA standards. Other sequences / non standard sequences are given as per customer's requirement.

Minilec Sequence Code	Operating Sequence Title	ISA Std. Code
S1	Manual Reset	M1
S2	Auto Reset	A1
S3	Ringback	R1-12
S4	First UP	F2M-1

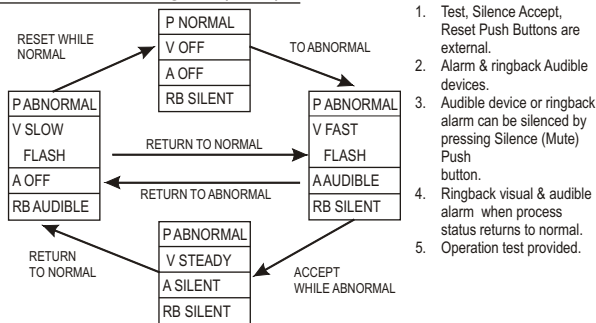
SEQUENCE S1 : Manual Reset (M1)



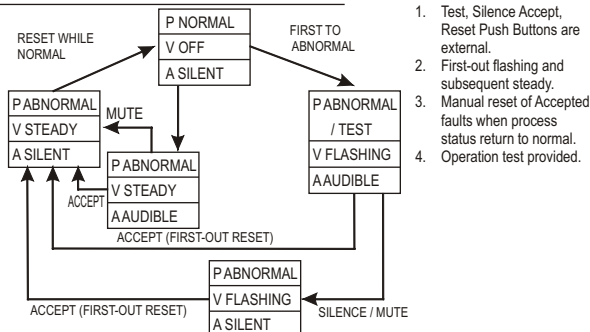
SEQUENCE S2 : Auto Reset (A1)



SEQUENCE S3 : Ringback (R1-12)



SEQUENCE S4 : First Out Manual Reset



Note:
 P : Process Status, V : Visual Alarm Status, A : Audible Alarm Status, RB : Ringback audible alarm status.

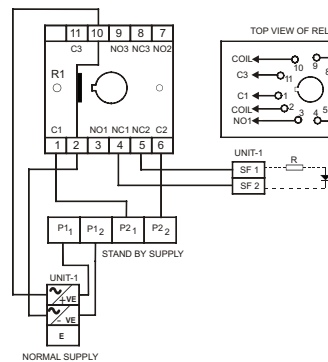
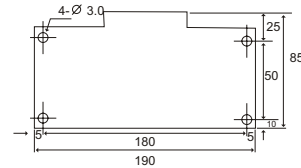
OPTIONAL ACCESSORIES

Repeat Relay Card

External Repeat Relay Cards can be connected for remote annunciation or interfacing with SCADA or DCS hardware. These cards are connected by plug-in type pre-fab cables.



Mounting & overall Dimensions of External Repeat Relay Card (8/16 Relays)

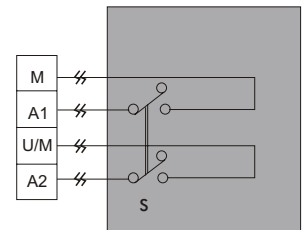


Supply Fail Annunciation

This feature enables the annunciator to operate on alternate stand-by power supply in case of mains supply failure. External relays with separate power supply module is supplied. If mains supply and stand-by supply are of same voltage level the power supply module is not required.

Manned / Unmanned Facility

This feature allows disabling the audio & visual indication on fault occurrence if the station is unmanned. The annunciator registers & records all faults occurring during unmanned mode and displays again manned mode.



RS 232 / 485 Converter

This is a universal converter for converting RS 232 serial port to RS 485 serial port or vice versa. It operates on 230 AC supply and is to be used with Minilec make interconnecting cables for Minilec annunciators & for PC.



d) Electronic / Industrial Hooter

Electronic Hooters with tone & volume control are supplied. Suitable for AC or DC supply Standard 96 x 96 enclosure.

PROTOCOM-1

Twin AC Controller



Protocom 1 is useful for two AC installations in small offices / businesses, ATM centers, residential houses, for AC units of 1 or 1.5 Tons. In Logic One Only one AC is operated at a time and equal running of each AC is ensured during continuous operation. In Second logic, One or both ACs will run as per Demand Built-in protection against UV, OV & OL for both AC units.

PROTOCOM - 1 saves energy by alternatively using only one air conditioner (or both in case of temp rise) and that too only when it is required depending upon logic selected. Two Types of different operational logics can be selected with Protocom-1 through front Keys and display. These LOGICS are as follows.

During Logic # 1 operation : only one AC at a time will run for set time cycle in alternate mode. Changeover will take place only if a) Cycle time is completed; b) Running AC is tripped due to Overload; c) Over Temp condition is present for more than 10 minutes.

If the room temperature keeps on rising even with the AC unit is in operation, it will energize OT alarm relay. It will stop running AC, ALARM LED will glow and switchover to another AC unit overriding present timing. Thus it also monitors and maintains the room temp.

During Logic # 2 operation : one AC will be running as normal running AC for set time cycle. If temp rises above OT set point, second AC is switched on as stand-by running AC. This AC will be running until temp drops below OT-Hysteresis level (LIFO). In case, both AC are running and cycle time completes, none of the AC will be switched off or no change over will take place. However if temp drops below OT-Hysteresis set point, first started AC will be made off and running AC will be considered as normal running AC (FIFO).

FUNCTIONING

NORMAL CYCLIC OPERATION - After power ON POWER LED indication glows steady. Display will start showing input AC voltage, AC1 & AC2 current and Room temp with scanning time of 5 sec. AC1 will become ON and will remain ON for next set time cycle. After completion of timing cycle, it will be OFF and second AC will ON. Second AC will remain ON for next set time cycle. This operation will be repeated in cyclic mode. When AC is on, respective LED glows steady. Internal timer will retain timing cycle (with resolution of 1 Hr.) in case of power failure with built in memory retention facility. Every time any AC will be made ON after ON delay of 2 Minutes.

UNDER VOLT AGE & OVER VOLTAGE : The PROTOCOM-1 offers built-in protection against under voltage (170 VAC with auto reset gap of 6 VA C) & over voltage (270 VA C with 6 VA C auto reset gap) with 4 sec. trip time delay. Upon a rising one of above condition running AC will switched OF & 'ALARM' indication turns ON. Display shows 'uV' / 'oV' indication. Once condition gets cleared, same AC will be made ON.

OVER LOAD - The PROTOCOM-1 protects the AC against over load condition of the set value. Running AC will switch OFF after O/L trip time delay. 'ALARM' LED will glow, display will show 'oL' indication & Alternative AC will be switched ON. Alternate AC will operate for remained time cycle & then again earlier AC will be switched ON.

OVER TEMP. - The PROTOCOM-1 unit operates the AC by sensing the room temperature with the help of built-in temperature sensor. After power ON or during running of any AC, the ambient temp is monitored and if it is above set OT level for more than 10 minutes, then 'ALARM' LED turns on, also OT ALARM relay gets energized. If PROTOCOM - 1 then running AC is switched OFF assuming that it is unable to lower the room temp below the set level. Alternative AC will switch ON. It will operate for remaining time cycle. After completion of time cycle other AC will be switched ON. 'OT ALARM' relay remain in energized condition till the ambient temp reduces below the hysteresis level of OT set point. In case LOGIC - 2 is selected, another AC will be made ON as stand by running AC.

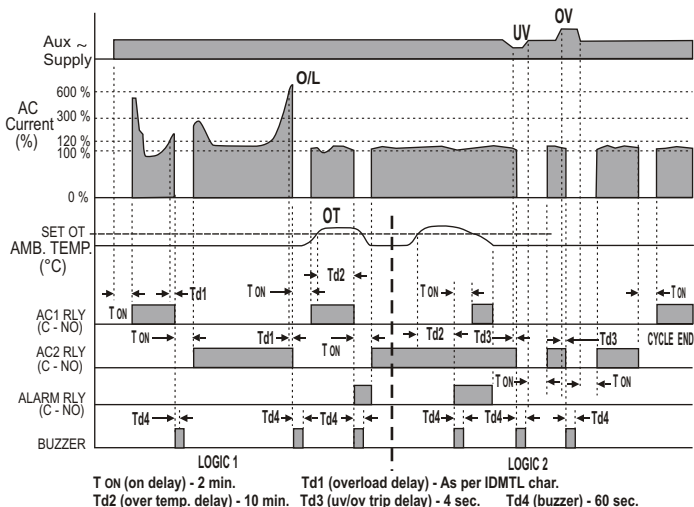
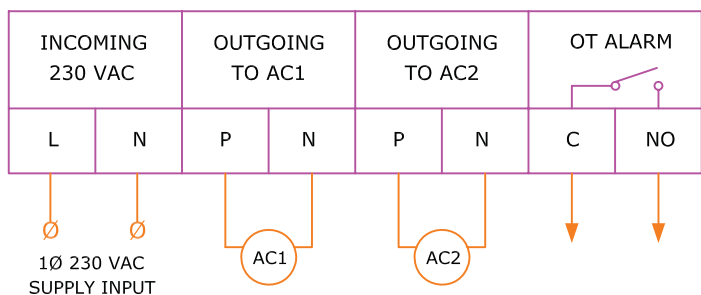
FAULT BUZZER - After arriving of above any of fault condition Fault buzzer will be ON & will be retain for 1 Minute or till clearance of fault Condition (except OL fault) whichever is earlier.

System supply	240 V AC, ±20%, 1 Ph
Frequency	50 (60) Hz, ±3%
Output Relay Contact	1 NO + 1 NO + 1 NO
Output Contact Rating	30 Amp @ 240 V AC (RLY 1 & RLY 2) 5 Amp (for RLY 3)
Current Setting	8-16 Amp (Variable)
Power ON Delay	2 mins., ±0.5 min (Fixed)
Cyclic time Delay	1 To 12 hours.
LED Indication	
Power On	Green
Alarm	Red
AC 1 On	Green
AC 2 On	Green
Enclosure	Sheet metal fabricated and powder coated
Dimension (approx.)	
Overall (LxWxD)	141 x 193.9 x 72
Mounting (L x W)	117 x 169.5
Weight	1000 gms.

Trip settings, time delay and resettings

Parameters	Under Voltage	Over Volt Age	Over Load	Over Temperature
Trip Setting	170 ± 3 VAC (Fixed)	270 ± 3VAC (Fixed) Keys & Display (Default Set - 12 A)	8-16 AMP (Settable by Keys & Display (Default Set - 30 ^o A)	20-40 ^o C (Settable by
Hysteresis for Auto Reset	6 VAC ± 3 VAC	6 VAC ± 3 VAC	N. A.	1 ^o C - 5 ^o C (Default - 3 ^o C)
Trip Time Delay	4 SEC. ± 0.5 SEC.	4 SEC ± 0.5SEC.	For 120% : 30 SEC ± 10SEC For 600% : 2SEC ± 0.5SEC	10 Minutes
Message on Display	uV	oV	OL1 - For AC 1 OL2 - For AC 2	Ot

Logic Setting	Logic # 1	Single ac operation only in alternate mode. [default set]
	Logic # 2	single or both ac operation based on temp. Rise in alternate mode.
Fault Buzzer	auto reset type built in buzzer for uV, oV, ol & Ot trip	
Alarm time	60sec. ± 5 Sec	
Setting Keys	3 Nos of Front Keys	



SOFT STARTERS

SOFT STARTERS

Three phase asynchronous motors are used in industry due to its simple construction and low maintenance operation. However, torque and motor current during the starting of a three-phase asynchronous squirrel-cage motor is usually not very favorable.

Therefore electronic controllers, like EMS 2000, are used to reduce the high from excessively high starting currents. By limited the accelerating torque, mechanical stress on the material to be conveyed or processed, and consequently on all mechanical parts of drive and driven machine, is reduced.

By starting motor at low voltage and avoiding large current peaks during starting with current limit feature the cost of electricity may also be reduced.



MODELS :
D3 EMS1
EMS2000,
EMS-MMI

FEATURES

- Suitable for Motors up to 5 HP and 10 to 75 HP
- Soft Start and Soft Stop
- Current Control
- Various Starting options
- MMI Functions with PC communication
- Equipped with important motor protection functions

Ordering Instructions

- ✓ Product Family Name
- ✓ Model Name
- ✓ System Name
- ✓ System Supply Voltage
- ✓ Aux. Supply / Control supply voltage
- ✓ Motor rating (HP / KW)
- ✓ Motor applications

EMS 2000



Minilec introduces a new range of Electronic Motor Starter - EMS-2000. These newly introduced Electronic Soft Starter are packed with unique features and are designed for a stand-alone applications.

Power Range (KW / HP)	Up to 55 KW / 75 HP
Nominal Current (Amp)	90 Amp. (Max)
Aux. Supply Voltage	In-Built
System Supply	415V AC (-20% + 15%)
Line Frequency	50 Hz ± 3%
Bypass facility	External Contactor
Start Mode	Normal High Volt Start Normal Low Volt Start Kick Low Volt Short duration start Kick High Volt Short duration start Kick Low Volt long duration start Kick High volt long duration start
Current Limit % In (FLA)	Range 150% to 350% of In (POT)
Ramp Up Time (Sec.)	1 to 60 in steps of 1 sec.
Ramp Down Time (Sec.)	Twice of start time
Protections	Single Phase, Reverse Phase SCR Short / Open, Unit overheat Overload (IDMTL) Class 10/20 Under Voltage, Over Voltage Lock Rotor 5 * IL < 5ms
Operating Temp.	0 to 45 Deg.°C
Device Dimensions	220 x 210 x 170 mm.
Weight in Kgs (Approx.)	10-20 HP - 10 Kg, 30-40 HP - 12 Kg. 50-60 HP - 14 Kg, 75 HP - 16 Kg.
Communication Protocol	N.A.

Protections

- Electronic over load protection - Adjustable range : 40% - 100% (100% = 5A, i.e. secondary of external CT)
- Under voltage (-20% ± 1% of system supply)
- SCR short/open fault protection (Trip delay less then 100 microsec.)
- Single phase protection (Trip delay less then 5 microsec.)
- Reverse phase protection (Trip delay less then 5 microsec.)
- Locked Rotor (for current above 500% to trip within 5 Sec.
- Heat - sink over temperature (75° C ± 5° C)
- HRC fuse with suitable ratings.

Controls (External / Remote)

- Start
- Stop (soft stop also valid in by- pass mode)
- Emergency stop / system reset (free run to stop)

Relay output

- Mains relay
- By pass relay
- Trip relay

Faults and Indications

To understand the fault indications refer following table.

Fault	Led	Indication
Overload	Under voltage / overload	Flashing
Lock rotor	Under voltage / overload	Flashing
Heat sink over	Under voltage / overload	Flashing
Temperature		
Under voltage	Under voltage / overload	Steady ON
SCR short	Single phase / SCR fault	Flashing
SCR open	Single phase / SCR fault	Flashing
Single phase	Single phase / SCR fault	Steady ON
Reverse phase	Trip relay ON	Steady ON

Typical fields of application for "EMS 2000" include.

- Electrical drives for processing materials which are sensitive to jerking and pulling.
- Pump drives.
- Drives with long periods of operation under no-load condition.
- Machines with transmission systems, belt or chain drives.
- Drives with large moments of inertia.

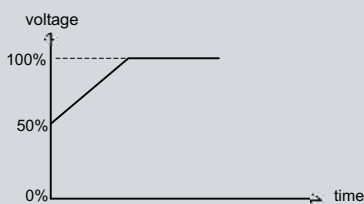
Typical equipment used with the EMS 2000 are :

- Fans
- Blowers
- Compressors
- Centrifugal pumps
- Conveyor belts
- Cranes

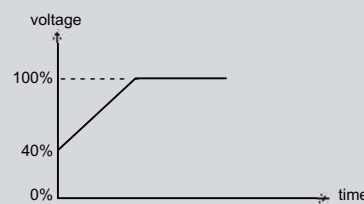
Features

- Soft Start - Adjustable soft start time range : 1 - 60 sec.
- Soft Stop - Twice of start time
- Normal high volt start.
- Kick start
- Adjustable kick duration 400/800 ms.
- Current limit
Adjustable range : 150% - 350% of FLA (100% = 5A, of secondary of external CT)
- Energy save (PFC)
- By pass

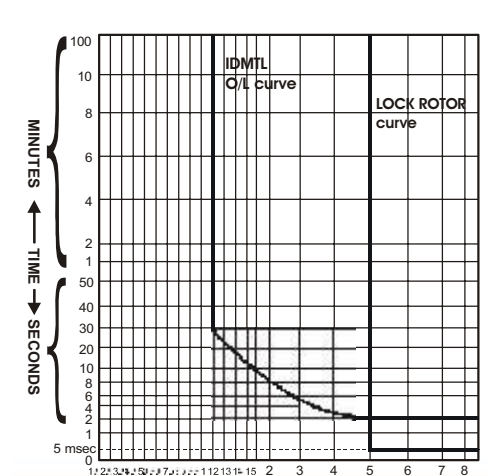
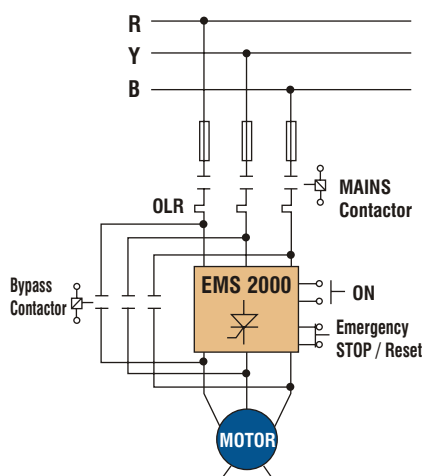
Normal High Volt Start (without Kick)



Normal low Volt Start (without Kick)



Long Duration Kick With High Volt Start



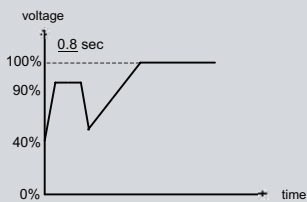
EMS-MMI



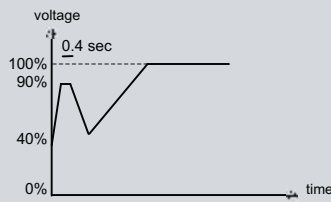
This is an advanced version of EMS 2000 with features like display, protections and communications

Power Range (KW / HP)	7.5 KW / 10 HP
Nominal Current (Amp)	16 Amp.
Aux. Supply Voltage	90 270V AC / DC
System Supply	415V AC (-20% + 15%)
Line Frequency	50 Hz \pm 3%
Bypass facility	External Contactor
Start Mode	Normal High Volt Start Normal Low Volt Start Kick Low Volt Short duration start Kick High Volt Short duration start Kick Low Volt long duration start Kick High volt long duration start
Current Limit % In (FLA)	Range 150% to 350% of In Selectably (Digital)
Ramp Up Time (Sec.)	1, 5, 10, 15, 20, 30, 45, 60 Selectably (DIP Switch)
Ramp Down Time (Sec.)	Twice of start time
Protections	Single Phase, Reverse Phase SCR Short / Open, Unit overheat Overload (IDMTL) Class 2 (Pot), 50% to 100% of FLA Under Voltage Lock Rotor 5 * IL < 5ms
Operating Temp.	0 to 45 Deg.°C
Device Dimensions	220 x 210 x 170 mm.
Weight in Kgs (Approx.)	10 Kg.
Communication	RS 232 & RS 485
Protocol	ASCII & RTU

Long Duration Kick With Low Volt Start



Short Duration Kick With High Volt Start



Short Duration Kick With Low Volt Start

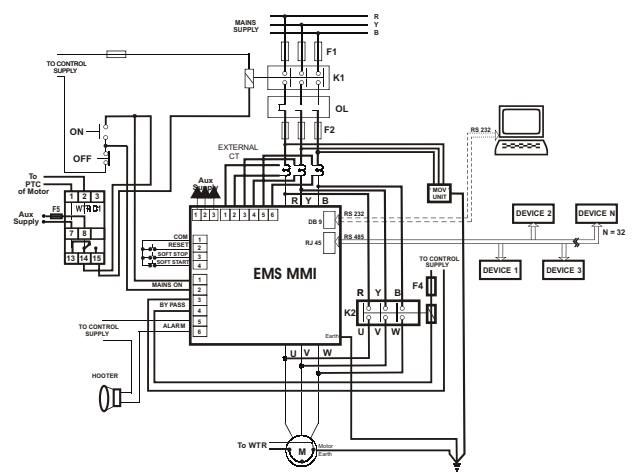
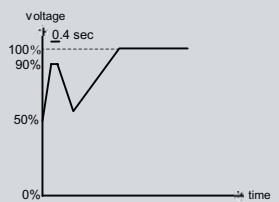


Fig. 7.2 External wiring diagram

D3 EMS1



This is a Small size soft starter with DIN-Rail mounting feature ideally suitable for light duty small motor applications

Power Range (KW / HP)	1.5 KW / 2 HP, 2.2 KW / 3 HP, 3.7 KW / 5 HP
Nominal Current (Amp)	8 Amps. Max.
Aux. Supply Voltage	24-110V AC/DC (+15% - 20%) 110-415V AC (+15% - 20%)
System Supply	415V AC + 15% - 20%
Line Frequency	50/60 Hz
Bypass facility	Built-in (Via Internal Contactor Relay)
Start Mode	Reduced Volt Start

Current Limit % In (FLA)	N.A.
Ramp Up Time (Sec.)	Adjustable from 0.5 to 10 Sec. (±25%)
Ramp Down Time (Sec.)	Adjustable from 0.5 to 10 Sec. (±25%)
Protections	N.A.

Operating Temp.	- 5 °C to 45 °C
Device Dimensions	Overall (L x W x D) 76 x 82 x 115
Weight in Kgs (Approx.)	340 gms (approx.)

Communication Protocol	N.A.
------------------------	------

With this soft starter 3-phase motors with nominal load currents upto 8 A can be soft-started and / or soft-stopped, thus reducing the inrush current and eliminating the damaging effects of high starting current surges. This is a compact starting device for small motors and hence there is room for more products on a given mounting platform. It is easy to install and to adjust because access for connections and adjustments is from the front. The device is snapped on to a DIN mountin rail. Starting and stopping time as well as initial torque can be independently adjusted by built-in potentiometers.

FEATURES

- 1) Reduced current in rush and mechanical shock
- 2) Soft, smooth, step-less acceleration & deceleration
- 3) Soft Start Time, Soft Stop Time, Initial Torque independently settable by means of potentiometer
- 4) Built-in by passrelay (For by passing SCR)
- 5) Easy to install and operate
- 6) Millions of switching cycles
- 7) Compact, lightweight
- 8) DIN-rail mounting (35mm)
- 9) LED indications for 3-ph ON, Ramp up / Ramp down and Run

CONTROL AND SETTINGS

D3EMS 1 has three potentiometers control on its front.

- 1) Ramp up : To set ramp up time (0.5 to 10 Sec.)
 - 2) Ramp down : To set ramp down time (0.5 to 10 Sec.)
 - 3) Initial torque : To set initial torque of the motor (0 to 80%)
- Set Ramp - up time and Initial Torque such that motor will start without jerk and humming noise.

FUNCTIONAL DESCRIPTION

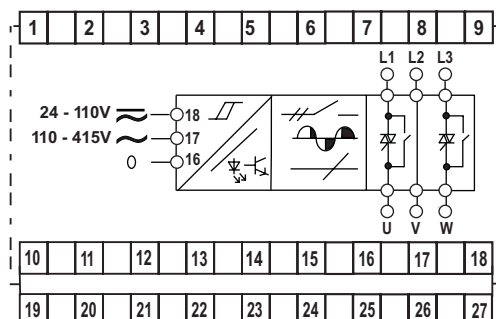
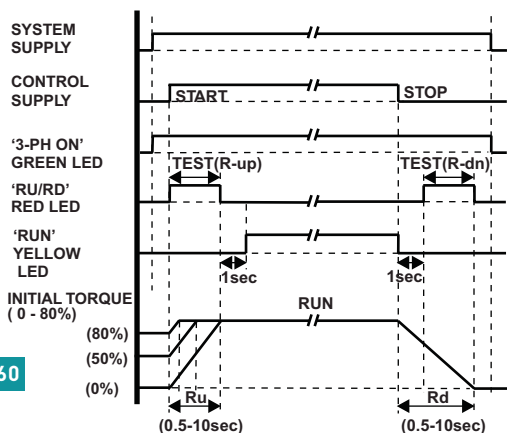
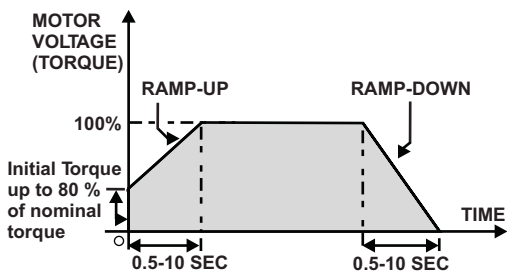
Soft Start : During ramp-up, the soft starter will gradually increase the voltage to the motor until it reaches full line voltage. The motor speed will depend on the actual load on the motor shaft.

Initial Torque : The initial torque is used to set starting voltage. This way it is possible to adapt the soft starter to an application requiring a higher starting torque. It can be adjusted from 0 to 80% of nominal torque.

Softstop : During ramp-down, the will soft starter gradually reduce the voltage to the motor thus reducing the torque and current. The soft stop feature is advantageous to avoid water hammering and cavitation on pumps and to avoid goods tilting on conveyors. It is typically used on motor application where a smooth startand / or stop is advantageous there by reduce the wear on gear and belt / chain drives. It is used for light duty applications such as small conveyors, bottle washers, pump-bore, slicer etc.

PROTECTION

This unit does not provide any protection. Hence user has to take care of necessary protections.



PRODUCTS FOR AGRI SECTOR

Minilec offers a range of products for protection of water pumps used by farmers. These are primarily to monitor incoming 3-phase supply for Single Phasing, Reverse Phasing and unbalanced supply and stop the pump in case of any fault. Additional features in some models include low water level monitoring (for borewell pumps) and auto restarting.

The products are specifically produced for marketing and use in India only.



MODELS

VSP2, VSP3, VPGD1

Autoswitch-2, Autoswitch-4
Autoswitch-5, Autoswitch-6

FEATURES

- Monitor incoming 3-phase supply
- Models with pre-wired connections
- Easy to fit inside most motor starters
- Switch for Auto-Manual operations
- Switch provision either built-in or external
- Adjustable on time delay
- All protections in auto & manual modes
- Built-in timer for star-delta operation
- Low level monitoring of borewell pumps

PROTECTIONS / FUNCTIONS

- Single Phasing,
- Reverse Phasing,
- Unbalanced supply (dry running)
- low water level
- On Delay to avoid immediate re-starting of pumps during auto mode

PRODUCTS FOR AGRISector

VSP2



Smallest size of single phasing preventor
Single phasing, reverse phasing, unbalanced supply
Auto reset, 1 NO output contact
Suitable for any HP/kW rating moboblock pumps

VSP3



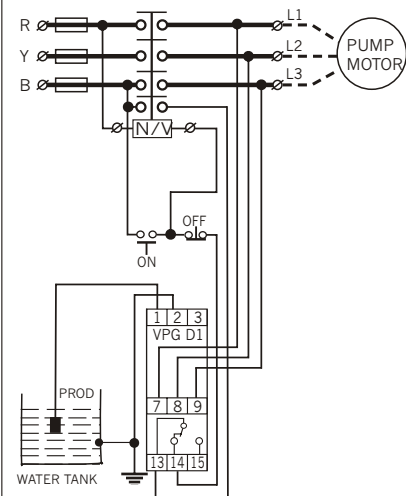
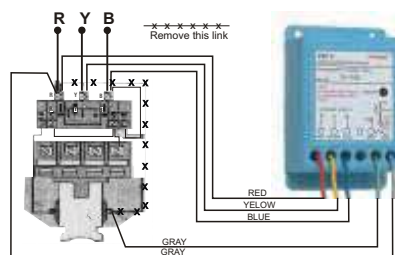
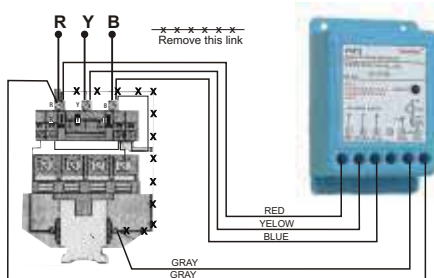
Single phasing, reverse phasing, unbalanced supply
Auto reset, 1 NO output contact
Suitable for any HP/kW rating moboblock pumps
Pre-wired terminals for easy connections

VPGD1



Single phasing, reverse phasing, unbalanced supply
Auto reset, 1 CO output contact
Suitable for any HP/kW rating submersible pumps
Low water level guard for dry running protection

Supply Voltage	415 VAC \pm 20%, 50 Hz \pm 3%	415V AC \pm 20%, 50 Hz \pm 3%	415VAC \pm 20%, 50 Hz \pm 3%
Output Relay Contact	1 NO	1 NO	1 CO
Output Contact Rating	5 Amp, 240 VAC (RESISTIVE)	5 Amp, 240 VAC (RESISTIVE)	5 Amp, 240 VAC (RESISTIVE)
Unbalance Trip Setting	40 V \pm 6 V	50 V \pm 10 VAC	40V \pm 6V
Trip Time Delay			
For unbalance	3.5 sec. \pm 1.5 sec.	3.5 sec. \pm 1.5 sec.	3.5 Sec \pm 1.5 Sec
For level sensing	N.A.	N.A.	3.5 Sec \pm 1.5 Sec
On Time Delay	N.A.	N.A.	N.A.
Star-Delta Changeover Time Delay	N.A.	N.A.	N.A.
Resetting	Auto Reset	Auto Reset	Auto Reset
Auto Switch	N. A.	N. A.	N. A.
Enclosure	HIP moulded, with Nylon connector strip	HIP moulded	ABS
Dimensions (mm)			
Overall (H x N x D)	103 x 66 x 43	103 x 66 x 43	76 x 30.5 x 117.5
Mounting	91 x 48	91 x 48	68 [center to center]
Mounting	Panel Mounting	Panel Mounting	Panel Mounting & 35mm Rail Mounting
Weight	260gms	250gms	300gms
Level sensor			
Quantity	—	—	1 NO. SS
Dimensions	—	—	24 [dia.] X 76 [L] 50
Operating Conditions			
Temperature	-5 °C TO + 60 °C	-5 °C TO + 60 °C	-5 °C TO + 60 °C
Humidity	Upto 95% Rh	Upto 95% Rh	Upto 95% Rh



Auto switch - 2



Single phasing, reverse phasing, unbalanced supply
Auto reset, 1 NO output contact
On time delay upto 1 Minute (fixed) Auto-Manual switch built-in. Suitable for any HP/kW rating pumps. Pre-wired terminals for easy connections

415 VAC \pm 20%, 50 Hz \pm 3%
1 NO
5 Amp, 240 VAC (RESISTIVE)
50 V \pm 10 VAC

4 Sec \pm 2 Sec
N.A.
45 Sec \pm 15 Sec

N.A.
Auto Reset
Present
Housing: HIP / Mounting Clamp: Nylon 6

102 x 35 x 81
90 mm Centre to Centre
Panel Mounting
300gms

-5 $^{\circ}$ C TO + 60 $^{\circ}$ C
Upto 95% Rh

Auto switch - 4



Single phasing, reverse phasing, unbalanced supply
Auto reset, 1 NO output contact
On time delay 1 to 10 Minutes (Adjustable) Auto-Manual switch built-in on front. Suitable for any HP/kW rating pumps. Pre-wired terminals for easy connections

415 VAC.(\pm 20%), 50 Hz \pm 3%
1 NO
5 Amp, 240 VAC (RESISTIVE)
50 V \pm 10 VAC

4 sec \pm 2 sec
N.A.
1 to 10 min

N.A.
Auto Reset
Present
Housing: HIP / Mounting Clamp: Nylon 6

102 X 35 X 81 mm
90 mm Centre to Centre
Panel Mounting
300gms

-5 $^{\circ}$ C TO + 60 $^{\circ}$ C
Upto 95% Rh

Auto switch - 5



Single phasing, reverse phasing, unbalanced supply
Auto reset, 1 NO output contact,
On time delay 1 to 10 Minutes (Adjustable), Provision for connecting Auto-Manual switch externally, Suitable for any HP/kW rating pumps, Pre-wired terminals for easy connections

200 - 450 VAC, 50 Hz \pm 3%
1 NO
5 Amp, 240 VAC (RESISTIVE)
50 V \pm 10 VAC

4 Sec \pm 2 Sec
N.A.
1 to 10 min

N.A.
Auto Reset
To be connected externally
Housing: HIP / Mounting Clamp: Nylon 6

102 X 35 X 81 mm
90 mm Centre to Centre
Panel Mounting
300gms

-5 $^{\circ}$ C TO + 60 $^{\circ}$ C
Upto 95% Rh

Auto switch - 6



Single phasing, reverse phasing, unbalanced supply
Auto reset, 1 NO output contact,
On time delay 2 to 3 Minutes (fixed), Star Delta Changeover Timer, Auto-Manual switch built-in on front, Suitable for any HP/kW rating pumps, Pre-wired terminals for easy connections

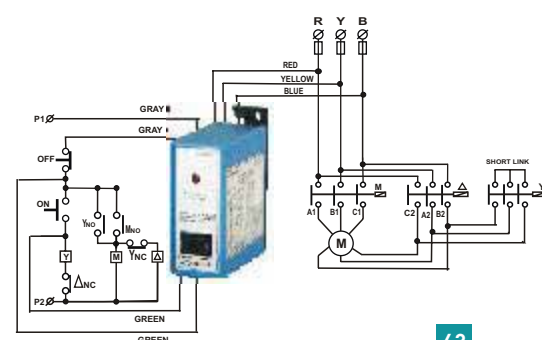
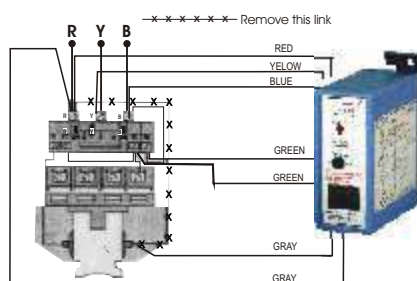
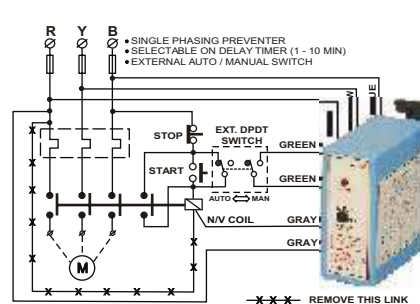
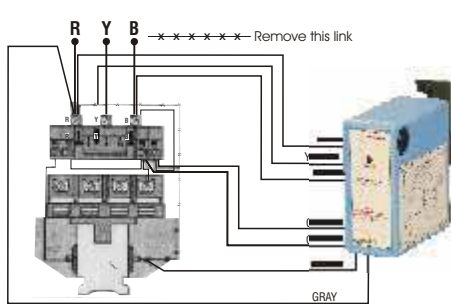
415VAC \pm 20%, 50 Hz \pm 3%
1 NO + 1 NO
5 Amp, 240 VAC (RESISTIVE)
50V \pm 10V

3.5 Sec \pm 1.5 Sec
N.A.
2 to 3 minutes [In auto mode]

5 to 7 Sec.
Auto Reset
Present
Housing: HIP / Mounting Clamp: Nylon 6

102 x 35 x 81
90 mm Centre to Centre
Panel Mounting
300gms (Approx.)

-5 $^{\circ}$ C TO + 60 $^{\circ}$ C
Upto 95% Rh



Pune - The City of Minilec

Pune has the sixth largest metropolitan economy and the highest per capita income in India, with the least income disparity between the rich and poor. This city is often addressed with the twin title of 'Oxford of the east' and 'Detroit of India'. Besides being a cultural capital of Western India, Pune is also an industrial and IT hub

Pune is well connected by road, rail, and air to all major cities in India. Pune has an international airport, two important railway junctions and three major state and inter-state bus junctions. Pune has a light rail/ skybus /light metro rail proposal for implementation

The Pirangoot Industrial estate is located to the west of the city of Pune. It is a clean and green area blessed with picturesque mountains. Minilec is located in the heart of green Pirangoot, about 15 Km. from Pune



ICC Towers - International convention Center



Pune University

Mumbai •
Pune •

Associate companies

The Intech Group

Statfield Equipments Pvt. Ltd.:

Pioneers in India in surface finishing equipments.



Intech Surface Coating Pvt. Ltd.:

Involved in industrial paint-shop technology and products.



Intech Auto-Stores and Conveyors Pvt. Ltd.:

Industrial products for material-flow management.

The Mint Group

Mint Biofuels Pvt. Ltd.:

Manufacturers of biodiesel and its bio-products



Yashaprabha Agro Pvt. Ltd.:

Cultivation & management of biofuel plantations.



Intech Energy Pvt. Ltd.:

Manufacture and erection of biofuel plants and machinery



Suyash Charitable Trust:

Working for social and financial upliftment of tribals in India.



minilec[®]

Minilec (India) Pvt. Ltd.

Factory & Head Office :

S. No. 1073/1-2-3, At Post : Pirangoot - 412 111.

Tal - Mulshi, Dist. Pune (India)

Tel. : (020) 22922162 / 22922354 -57 Fax : (020) 22922134

E-mail : mkt1@minilecgroup.com

Branch Offices :

Mumbai: Tel. : 2596 51 41

E-mail : mumbai@minilecgroup.com

Delhi : Tel. : 2489 47 32

E-mail : delhi@minilecgroup.com

Bangalore : Tel. : 2486 74 18

E-mail : bangalore@minilecgroup.com

Kolkata : Tel. : 2485 14 18

E-mail : kolkata@minilecgroup.com

Customer Support: E-mail : servicing@minilecgroup.com

www.minilecgroup.com

Cat. No. GC 083 / R1

Authorised Dealer

