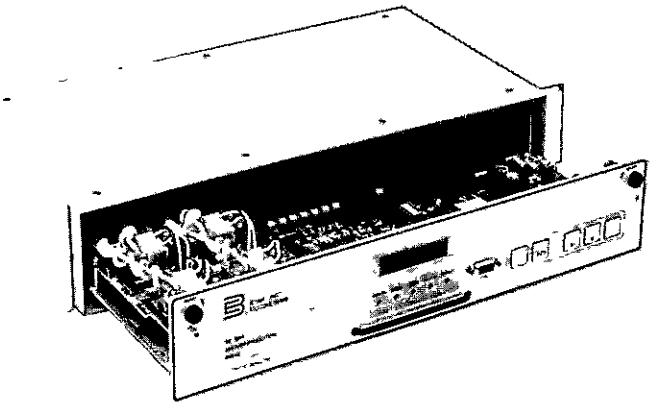


BE 1 RELAYS STANDARDS, DIMENSIONS & ACCESSORIES BULLETIN

*Case	Model No.	Relay Type	Bulletin
M	BE1-24	Volts per Hertz Overexcitation	UDN
S	BE1-25	Sync-Check	UBP
R	BE1-25/79M	Sync-Check/Multishot Reclosing	UDM
M	BE1-25/79S	Sync-Check/Single Shot Reclosing	UBQ
R	BE1-25/79TR	Sync-Check/Reclosing	UDW
S	BE1-27	Undervoltage	UBF
S	BE1-27/59	Over/Undervoltage	UBF
M,S	BE1-32R	Directional Overpower	UBU
M,S	BE1-32O/U	Directional Over/Underpower	UBU
S	BE1-40Q	Loss of Excitation	UBW
S	BE1-46N	Negative Sequence Overcurrent	UDJ
S	BE1-47N	Negative Sequence Voltage	UDK
S	BE1-49	Temperature	UBJ
S	BE1-50	Instantaneous Overcurrent	UBC
S	BE1-50BF	Breaker Failure	UBT
A	BE1-50/51B	Time Overcurrent	UHD
C	BE1-50/51M	Time Overcurrent	UHE
R	BE1-BPR	Breaker Protection	UHG
R	BE1-DFPR	Distribution Feeder Protection	UDU
M,S	BE1-51	Time Overcurrent	UDA
M,S	BE1-51/27C	Time Overcurrent w/Voltage Control	UDA
M,S	BE1-51/27R	Time Overcurrent w/Voltage Restraint	UDA
M,S	BE1-51TC	Time Overcurrent w/Torque Control	UDP
S	BE1-59	Overvoltage	UBF
S	BE1-59N	Ground Fault Overvoltage	UBG
S	BE1-59NC	Capacitor Neutral Overvoltage	UHF
S	BE1-60	Voltage Balance	UBS
M	BE1-67	Phase Directional Time Overcurrent	UDQ
M	BE1-67N	Ground Directional Time Overcurrent	UDR
S	BE1-79	Multishot Reclosing	UBL
S	BE1-79M	Multishot Reclosing	UDL
S	BE1-79S	Single Shot Reclosing	UBN
S	BE1-81	Digital Underfrequency	UBM
M,S	BE1-81O/U	Digital Frequency	UBR
S	BE1-87G	Variable Percentage Differential	UBK
M	BE1-87T	Transformer Differential	UHA
R	BE1-25A	Automatic Synchronizer	UIM

* A=A-1 Case size; C=C-1 Case size; M=M-1 Case size; S=S-1 Case size; R=19" Rack

Basler Electric

BOX 269 HIGHLAND, ILLINOIS 62249, U.S.A. PHONE 618-654-2341 FAX 618-654-2351

RELAY STANDARDS

APPLICABLE STANDARDS

Basler Electric protective relays are designed to meet or exceed industry standards as well as those set by Basler Electric.

INDUSTRY STANDARDS

- ANSI/IEEE C37.90-1989, IEEE Standard for Relays and Relay Systems Associated with Electric Power Apparatus.
- IEEE C37.90.1-1989, IEEE Standard Surge Withstand Capability (SWC) Tests for Protective Relays and Relay Systems.
- ANSI/IEEE C37.90.2, IEEE Trial-Use Standard on Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers.
- IEC 255-5, Electrical Relays, Part 5: Insulation Tests for Electrical Relays.
- IEC 255-6, Electrical Relays, Part 6: Measuring Relays with more than one Input Energizing Quantity. Includes high frequency disturbance test.

BASLER STANDARDS

- 99-0868 Moisture Resistance Tests
- 99-0976 Vibration and Shock Tests
- 99-1007 Transient/Dielectric Tests
- 99-1044 Temperature Tests
- 99-1188 RFI Susceptibility Tests
- 99-1396 Communication Specification

AGENCY RECOGNITION

Relays requiring certification are submitted for recognition under UL 508. Many models are recognized. Check with Basler for the latest list.

GENERAL SPECIFICATIONS

The following general specifications apply to all Basler BE1 series protective relays. Functional specifications are found in product bulletins.

POWER SUPPLY VOLTAGES

Nominal Voltage	Operating Voltage Range	Frequency Range
48Vdc	24 to 60 Vdc	N/A
125 Vdc 100/120 Vac	62 to 150 Vdc 90 to 132 Vac	N/A 40-70 Hz
24 Vdc	14 to 32 Vdc	N/A
48 Vdc 125 Vdc	24 to 60 Vdc 62 to 150 Vdc	N/A N/A
250 Vdc 230 Vac	140 to 280 Vdc 190 to 270 Vac	N/A 40-70 Hz

OUTPUT CONTACTS

Rated Voltage	Resistive			Inductive	
	Make 0.2 sec.	Carry Continuous	Break	Break	L/R
120/240 Vac	30 A	7 A	7 A	0.3 A	0.04
125 Vdc	30 A	7 A	0.3 A	0.3 A	0.04
250 Vdc	30 A	7 A	0.3 A	0.3 A	0.04
500 Vdc	15 A	7 A	0.1 A	---	---

Output contact status is defined by Basler as the state of the output contact when relay operating power has been removed. The following Tables define contact status for relays having an "over" trip function, an "under" trip function or an "over/under" trip capability.

"OVER" TRIP FUNCTION

Contact Configuration	Operating Power OFF	Operating Power ON	
		Sensing Input Less Than Trip Setting	Sensing Input Greater Than Trip Setting
Normally Open (NO)	Open	Open	Closed
Normally Closed (NC)	Closed	Closed	Open

"UNDER" TRIP FUNCTION

Contact Configuration	Operating Power OFF	Operating Power ON	
		Sensing Input Less Than Trip Setting	Sensing Input Greater Than Trip Setting
Normally Open (NO)	Open	Closed	Open
Normally Closed (NC)	Closed	Open	Closed

"OVER/UNDER" TRIP FUNCTION

Contact Configuration And Trip Function	Operating Power OFF	Operating Power ON	
		Sensing Input Less Than Trip Setting	Sensing Input Greater Than Trip Setting
NO (Over)	Open	Open	Closed
NC (Over)	Closed	Closed	Open
NO (Under)	Open	Closed	Open
NC (Under)	Closed	Open	Closed

RELAY STANDARDS
(CONTINUED)

TARGETS

Either current operated or internally operated targets may be selected. The individual relay product bulletin will identify the availability and configuration of targets for each model relay.

A current operated target requires a minimum of 0.2A (ac or dc) to flow through the output trip circuit to actuate the indicator. This target type can only be specifiifed when the main output relay contacts are specified as normally open (NO).

An internally operated target is operated by an electronic signal in parallel with the output relay drive signal. This type of target may be selected for use with either normally open (NO) or normally closed (NC) output contacts.

RADIO FREQUENCY INTERFERENCE

Field tested to be immune to radiation from 5 Watt transceiver in 144 MHz and 440 MHz bands with antenna located 6 inches from relay.

OPERATING TEMPERATURE

-40 degrees C (-40 degrees F) to 70 degrees C (158 degrees F).

VIBRATION

Withstands 2g in each of three mutually perpendicular planes over the frequency range of 10 to 500 Hz without structural damage or degradation of performance.

SHOCK

Withstands 15g in each of three mutually perpendicular planes without structural damage or degradation of performance.

DIELECTRIC/SURGE WITHSTAND

ISOLATION

1500 - 2500 Vac depending on model; see product bulletins.

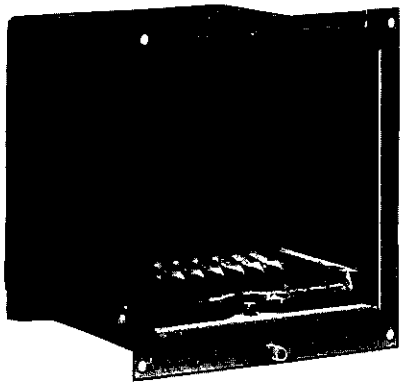
SURGE WITHSTAND CAPABILITY

Withstands 1 MHz bursts of conducted energy with 2500V crests without damage or degradation of performance.

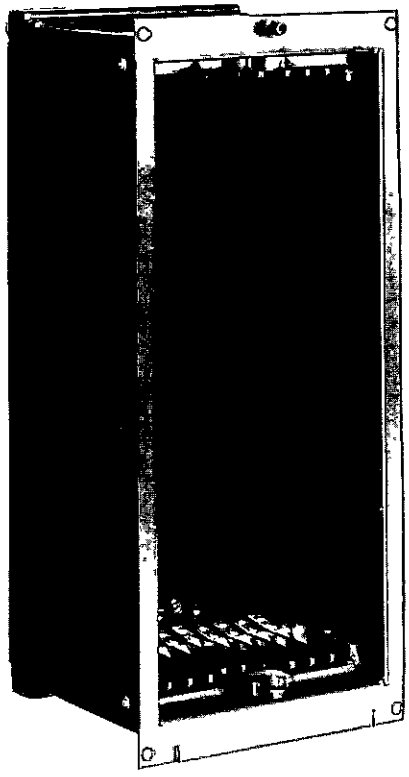
FAST TRANSIENT

Withstands 150 nanosecond impulses with a crest value of 5000 volts without damage or degradation of performance.

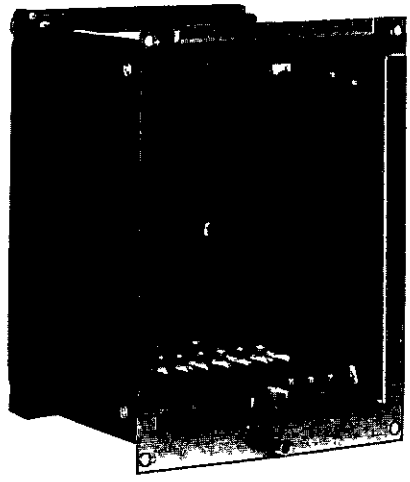
RELAY CASES



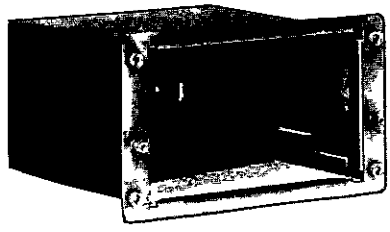
A-1



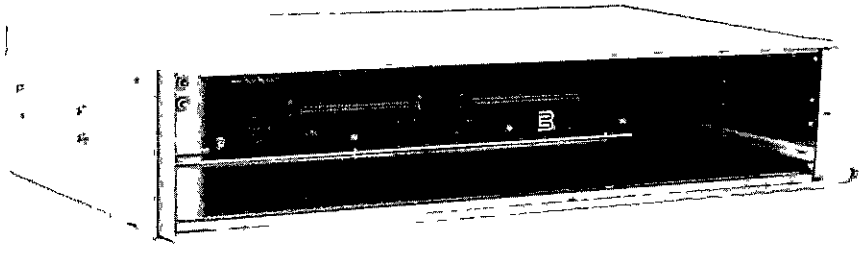
M-1



S-1



C-1



RACK

CONSTRUCTION OF A-1, M-1 & S-1 CASES

RELAY CASE

Each of these three cases, (A-1, M-1 & S-1), consists of a fabricated steel and phenolic enclosure, which is resistant to dust and moisture. They are designed to house either single or double ended relay units with one or two connecting plugs as required for the specific relay type. Round, washer head terminal screws are located on the rear of the case for ease of connection. These cases are capable of semi-flush or projection mounting as shown in the dimension and drilling diagrams, pages 6 through 15.

DRAWOUT CRADLE

The relay unit (drawout cradle) is a steel frame which houses the motherboard, magnetics chassis and all printed circuit boards that are required for the specific relay type. Locking levers at the top and bottom secure the drawout cradle to the case and enable easy removal for inspection.

CONNECTING PLUGS

One or two connecting plugs, as required, electrically connect the drawout cradle to the system interconnections at the top and/or bottom of the relay case. The contact fingers of the connecting plugs, and the relay case and cradle terminal blocks, are silver plated.

FRONT COVER

The front cover is a gasketed phenolic frame with glass window to enable visual inspection of the relay's setting adjustments and indicators. The front cover is secured to the case by a flange at the top and a single sealable thumbscrew at the bottom center of the front cover. The target reset lever projects from the bottom or front of the cover and enables the targets to be reset without removal of the front cover.

CONSTRUCTION OF C-1 CASE

RELAY CASE

The C1 Case is a fabricated steel enclosure resistant to dust and moisture. The case is available in only one size and is designed for semi-flush mounting. The case includes guides to support the cradle assembly when mounted horizontally or vertically. Round washer head terminal screws are located on the rear of the case for ease of connection, see page 16. External test provisions must be provided to test the relay in its case, or the drawout cradle may be removed and tested in a test jig.

DRAWOUT CRADLE

The relay unit (drawout cradle) consists of a steel chassis upon which all the parts for the relay are mounted. The cradle is designed so that the front cover cannot be installed on the case unless the cradle is fully inserted into the connection block on the rear of the relay case. Input current circuits are shorted when the cradle is removed from the case.

FRONT COVER

The front cover is molded out of clear flame retardant plastic conforming to the requirements of UL 508. The cover includes a target reset button that extends out from the front cover.

CONSTRUCTION OF RACK MOUNT CASES

RACK MOUNT CASE

Rack mount cases conform to standard 19 inch rack mount dimensions. The heights of the cases are specified in terms of the number (n) of standard rack units. Each rack unit is 1.75 inches and Basler cases range from 2 to 5 rack units. This is shown on page 17. The depth of rack mount cases varies depending on the relay model. Some relay models include built-in test provisions for testing the relay in the case. Other relay models require external provisions to test the relay in its case, or the relay module may be removed and tested in a test jig.

CONSTRUCTION

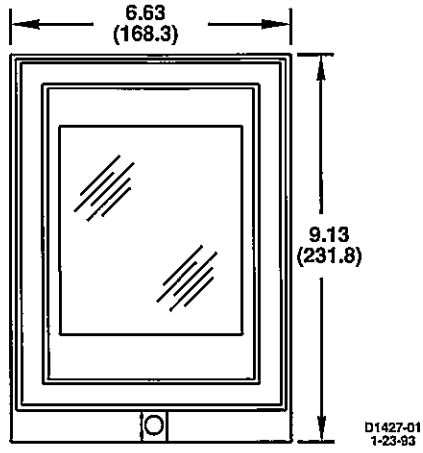
All relays are made with drawout capability. Some units have several drawout modules; others have one complete drawout assembly.

FRONT COVER

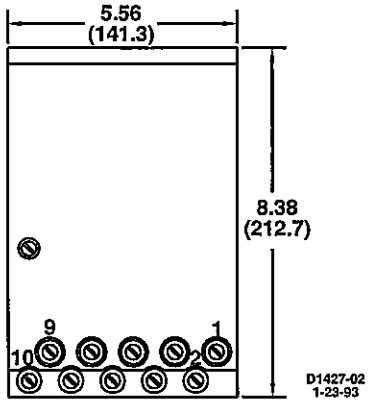
Front covers for rack mount cases come in two styles depending on the relay model. One has a glass window and the others are made with plastic windows. Covers include a means to reset targets without removing the cover.

S1 DIMENSIONS
SEMI-FLUSH MOUNT

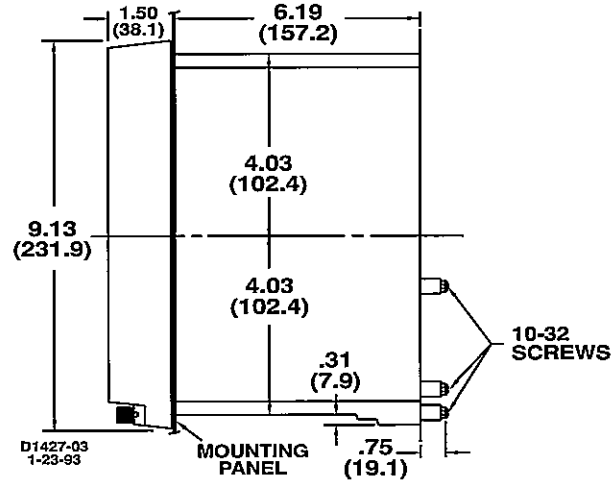
Relays may be mounted at any convenient angle.



FRONT VIEW



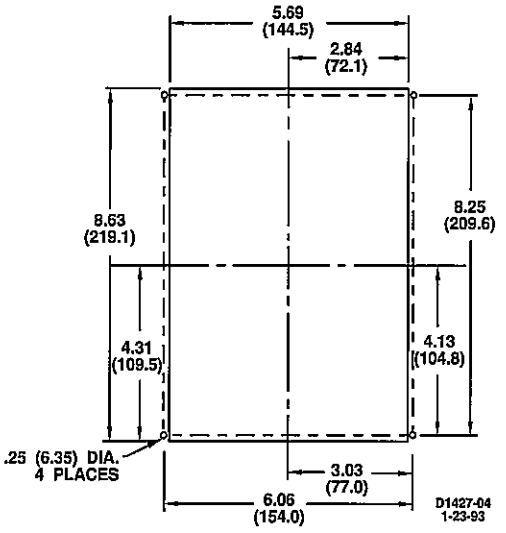
REAR VIEW
Single Ended Case



SIDE VIEW
Single Ended Case

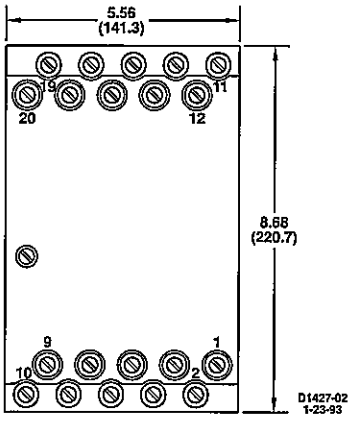
S1 DIMENSIONS AND DRILLING DIAGRAM
SEMI-FLUSH MOUNT

Relays may be mounted at any convenient angle.



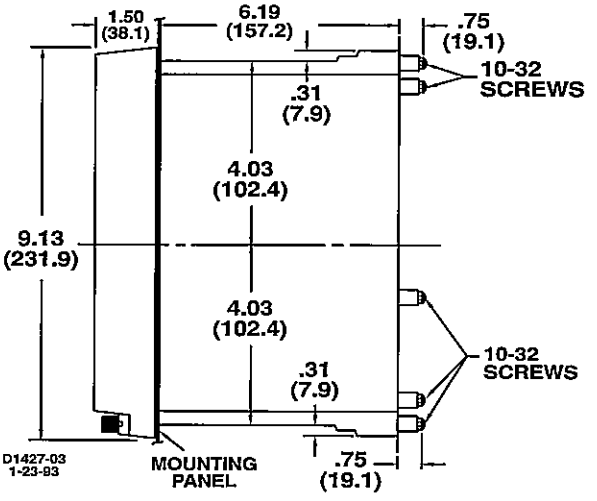
DRILLING DIAGRAM

Single or Double Ended
(Rear of panel)



REAR VIEW

Double Ended Case

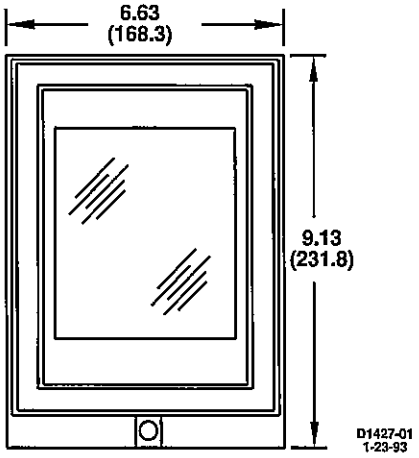


SIDE VIEW

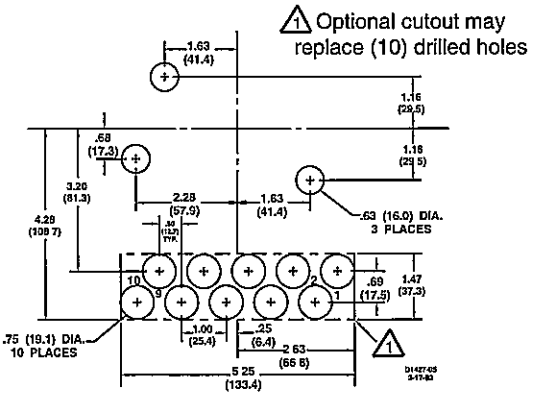
Double Ended Case

S1 DIMENSIONS AND DRILLING DIAGRAM
PROJECTION MOUNT

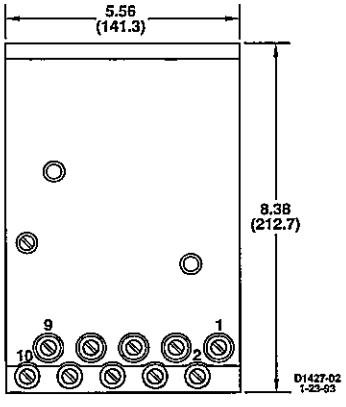
Relays may be mounted at any convenient angle.



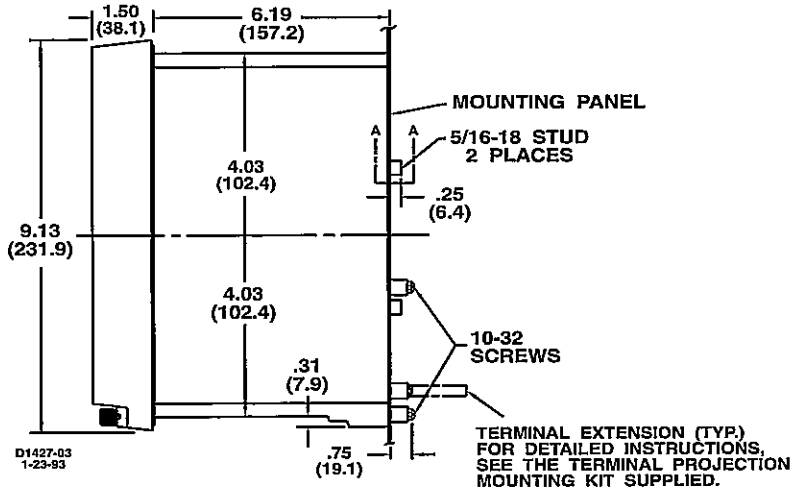
FRONT VIEW



DRILLING DIAGRAM
Single Ended (Rear of panel)



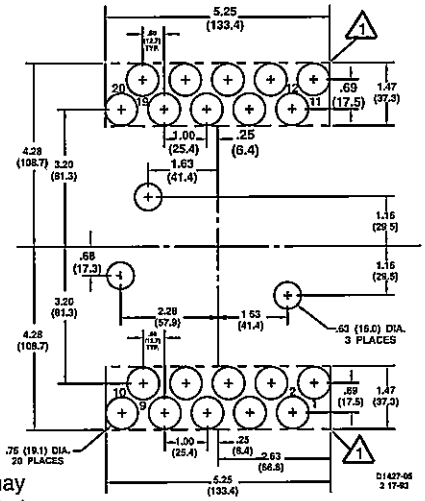
REAR VIEW
Single Ended Case



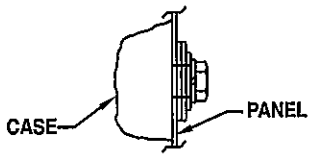
SIDE VIEW
Single Ended Case

S1 DIMENSIONS AND DRILLING DIAGRAM
PROJECTION MOUNT

Relays may be mounted at any convenient angle.



1 Optional cutout may replace (10) drilled holes

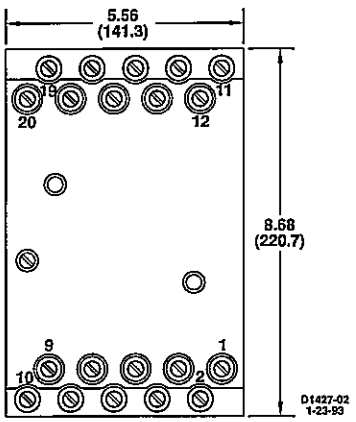


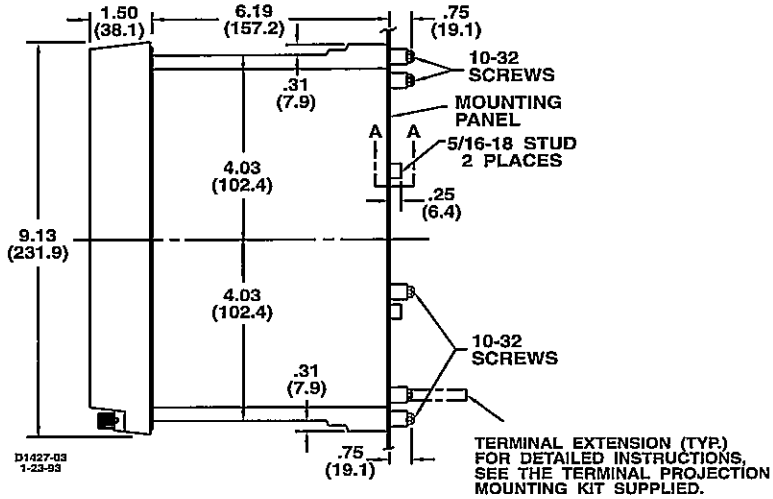
DETAIL A-A

SHOWING THE ADDITION OF WASHERS OVER THE BOSS TO TIGHTEN THE RELAY AGAINST THE PANEL.

D1427-06
1-23-93

DRILLING DIAGRAM
Double Ended (Rear of panel)





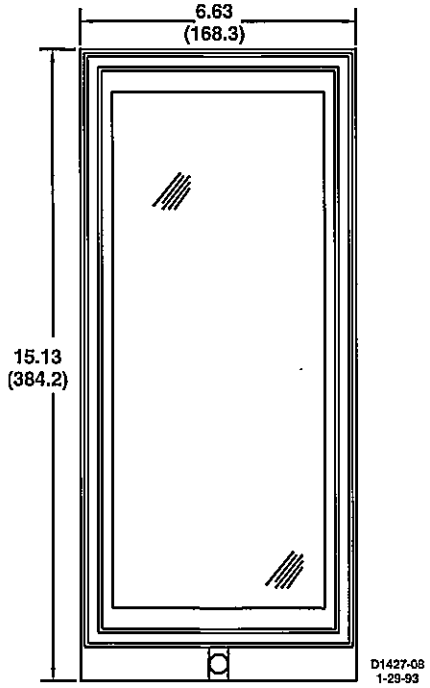
TERMINAL EXTENSION (TYP.) FOR DETAILED INSTRUCTIONS, SEE THE TERMINAL PROJECTION MOUNTING KIT SUPPLIED.

REAR VIEW
Double Ended Case

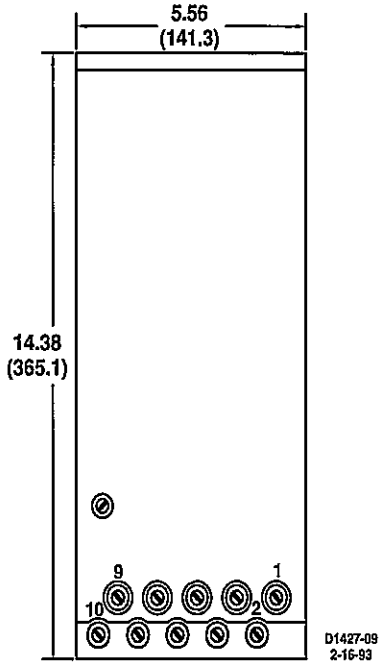
SIDE VIEW
Double Ended Case

M1 DIMENSIONS
SEMI-FLUSH MOUNT

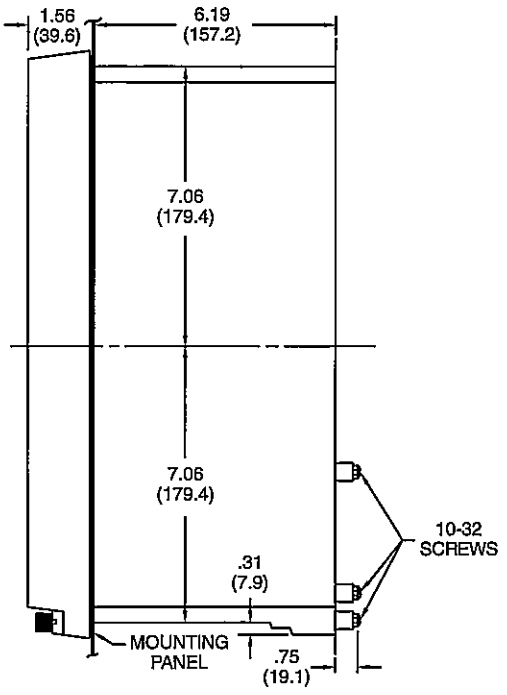
Relays may be mounted at any convenient angle.



FRONT VIEW



REAR VIEW
Single Ended Case



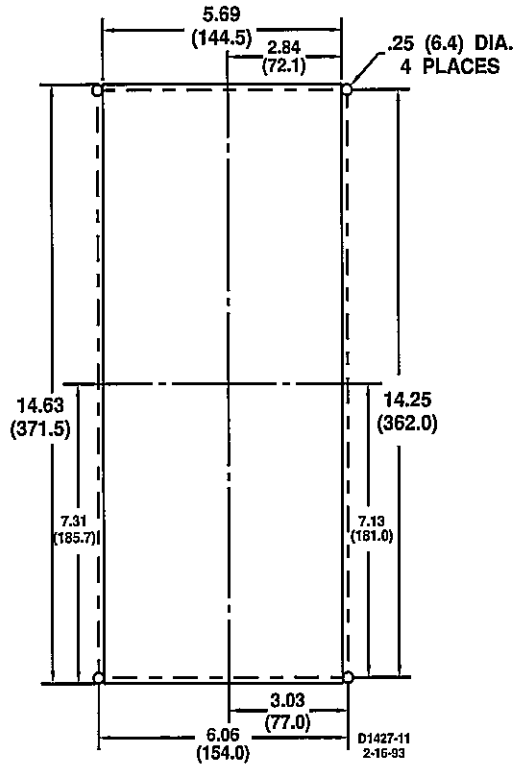
SIDE VIEW
Single Ended Case

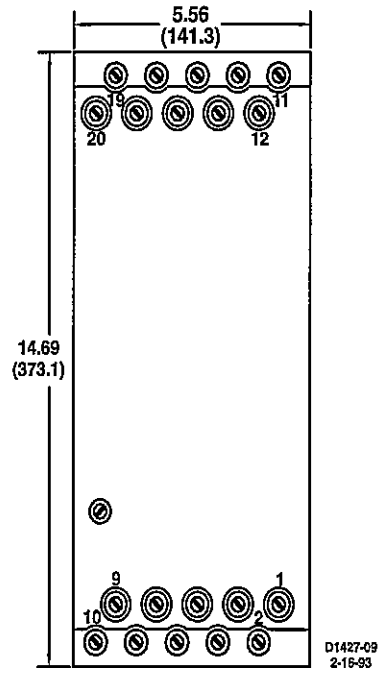
M1 DIMENSIONS AND DRILLING DIAGRAM
SEMI-FLUSH MOUNT

Relays may be mounted at any convenient angle.

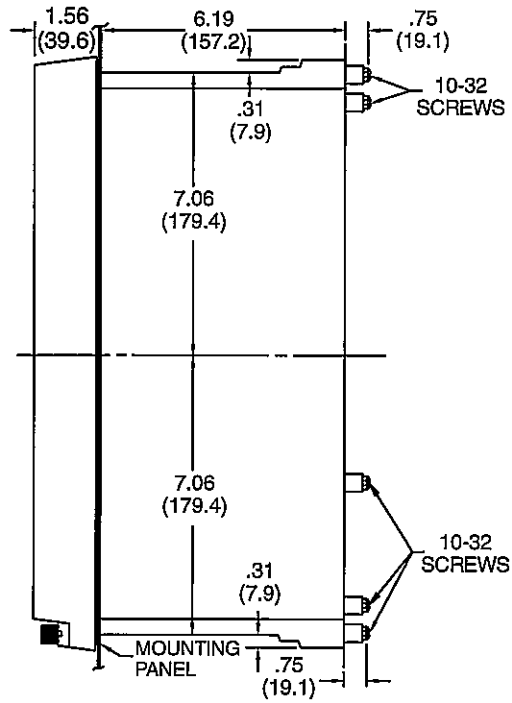
DRILLING DIAGRAM

Single or Double Ended
(Rear of panel)





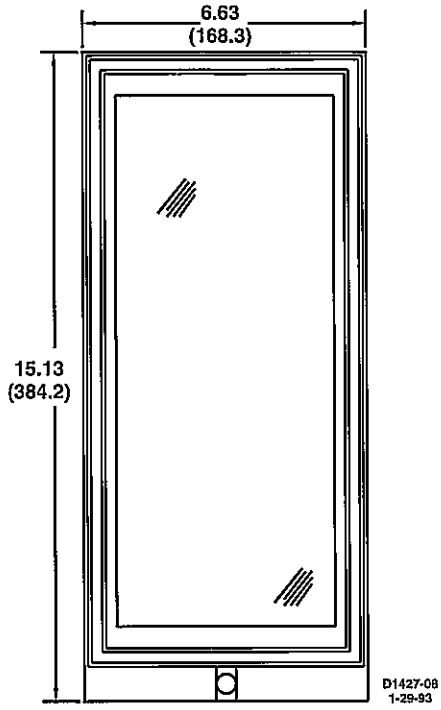
REAR VIEW
Double Ended Case



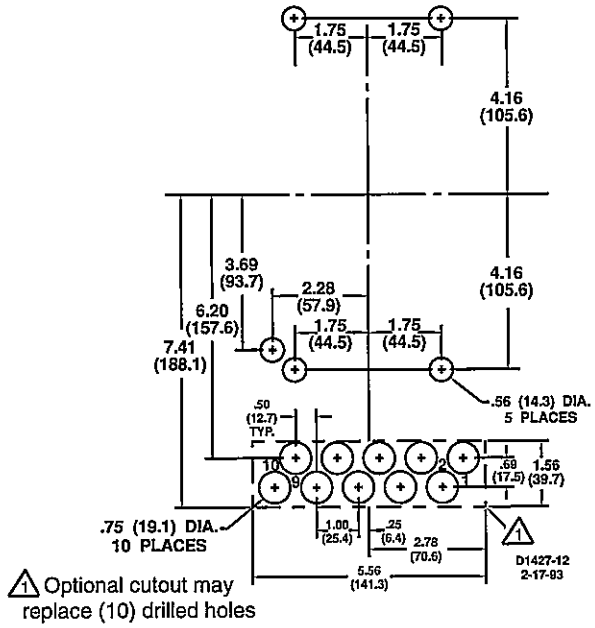
SIDE VIEW
Double Ended Case

M1 DIMENSIONS AND DRILLING DIAGRAM
PROJECTION MOUNT

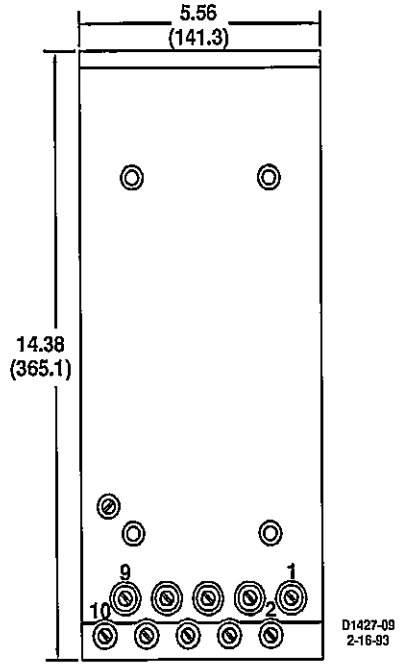
Relays may be mounted at any convenient angle.



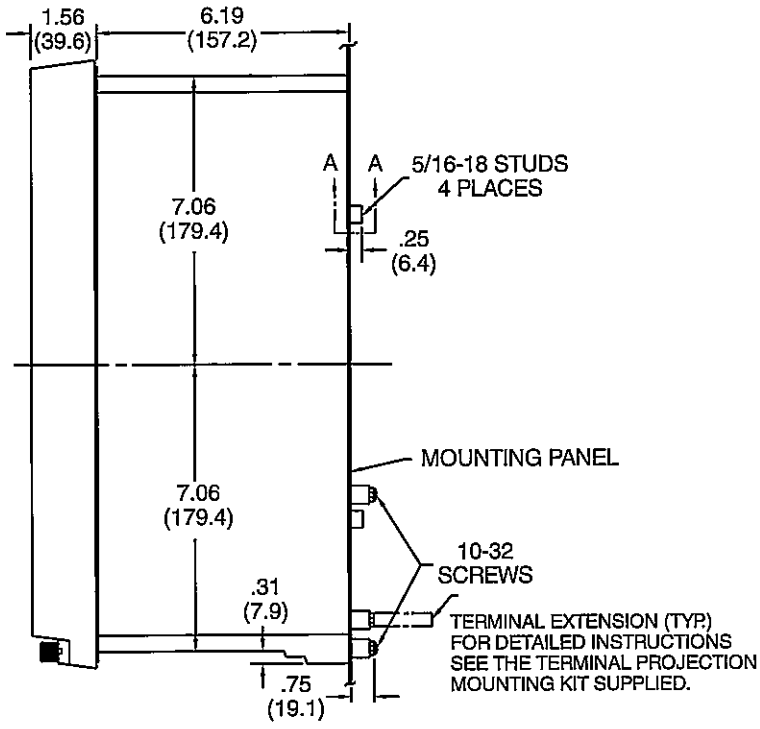
FRONT VIEW



DRILLING DIAGRAM
Single Ended (Rear of panel)



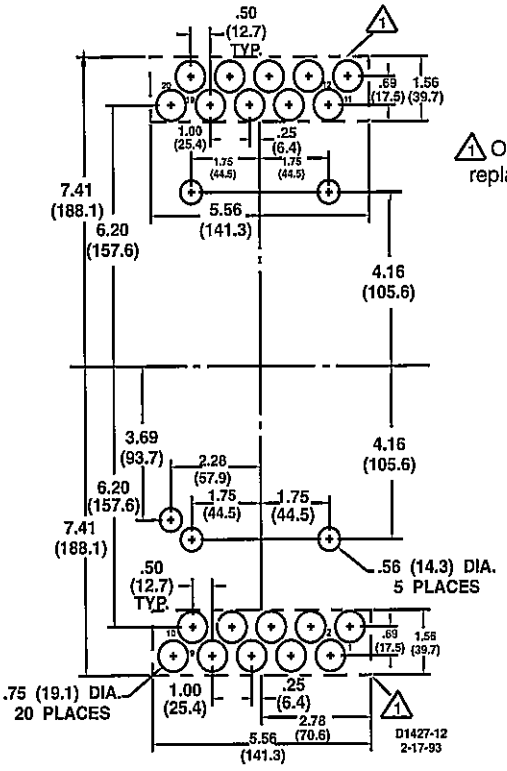
REAR VIEW
Single Ended Case



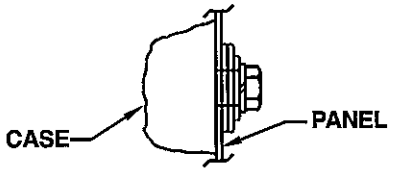
SIDE VIEW
Single Ended Case

M1 DIMENSIONS AND DRILLING DIAGRAM
PROJECTION MOUNT

Relays may be mounted at any convenient angle.



1 Optional cutout may replace (10) drilled holes

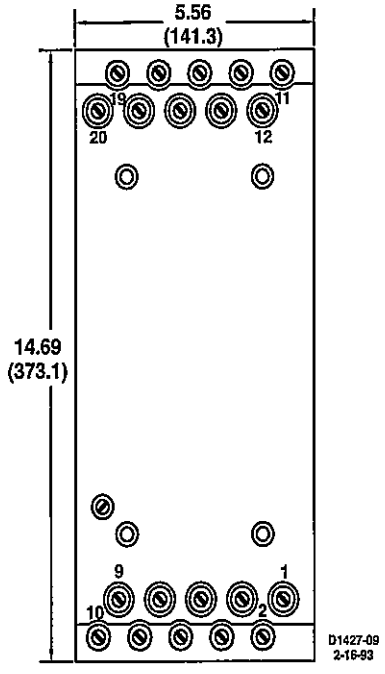


DETAIL A-A

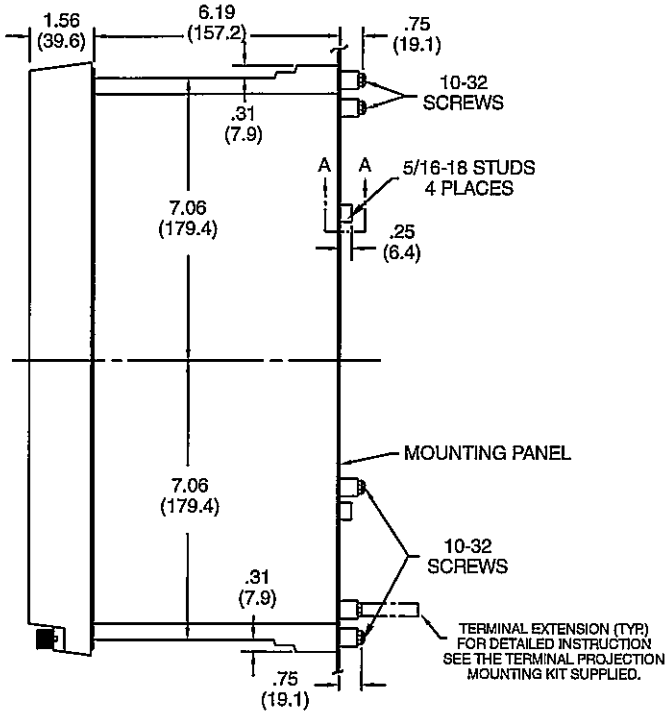
SHOWING THE ADDITION OF WASHERS OVER THE BOSS TO TIGHTEN THE RELAY AGAINST THE PANEL.

D1427-05
1-23-93

DRILLING DIAGRAM
Double Ended (Rear of panel)



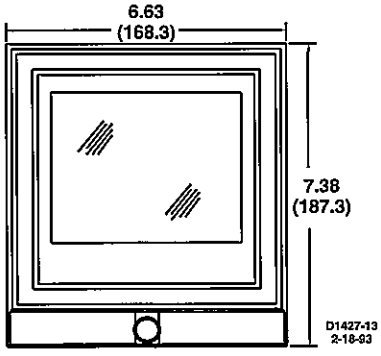
REAR VIEW
Double Ended Case



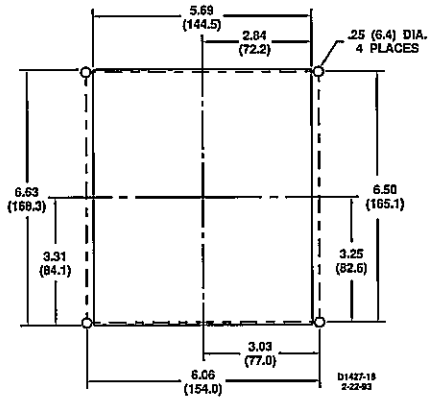
SIDE VIEW
Double Ended Case

A1 DIMENSIONS AND DRILLING DIAGRAM
SEMI-FLUSH MOUNT

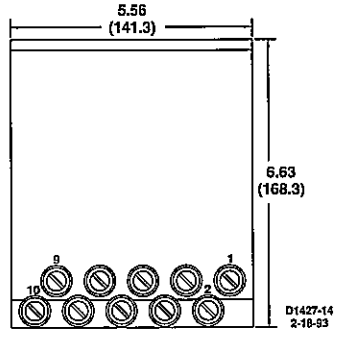
Relays may be mounted at any convenient angle.



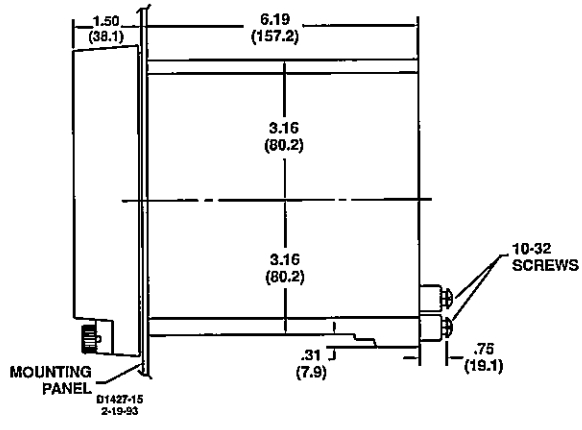
FRONT VIEW



DRILLING DIAGRAM
(Rear of panel)



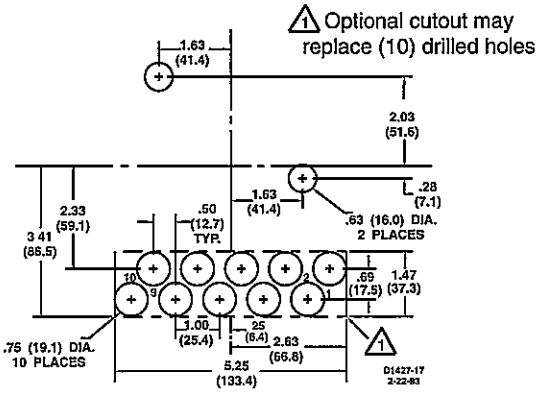
REAR VIEW

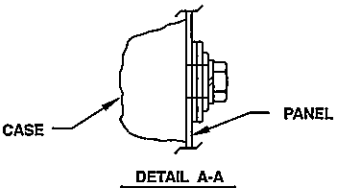


SIDE VIEW

A1 DIMENSIONS AND DRILLING DIAGRAM
PROJECTION MOUNT

Relays may be mounted at any convenient angle.





SHOWING THE ADDITION OF WASHERS OVER THE BOSS TO TIGHTEN THE RELAY AGAINST THE PANEL.

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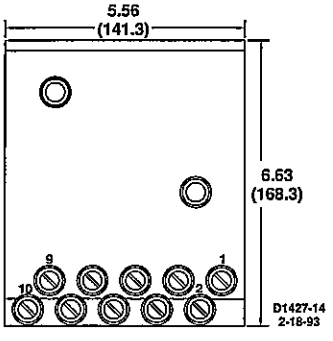
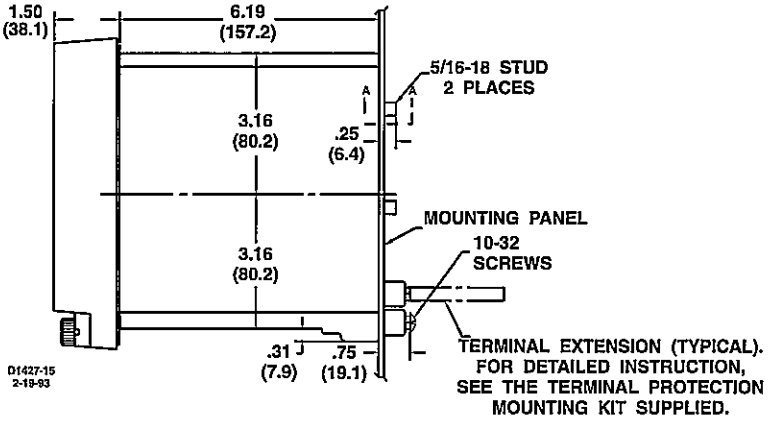
DRILLING DIAGRAM
(Rear of panel)



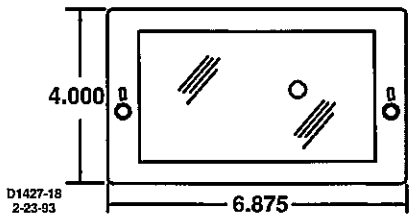
REAR VIEW



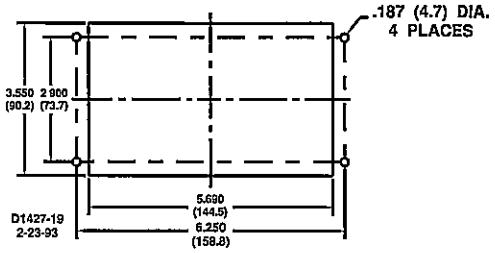
SIDE VIEW

C1 DIMENSIONS AND DRILLING DIAGRAM

Relays may be mounted at any convenient angle.

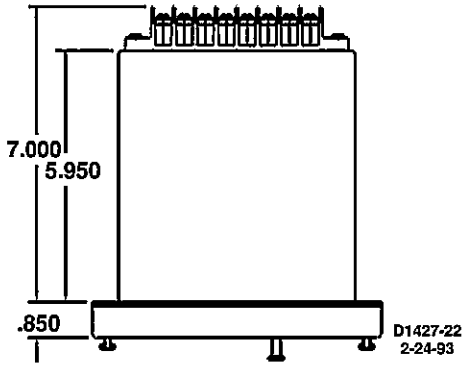


FRONT VIEW

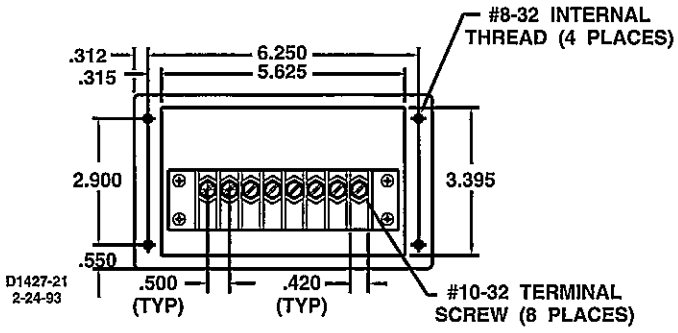


DRILLING DIAGRAM

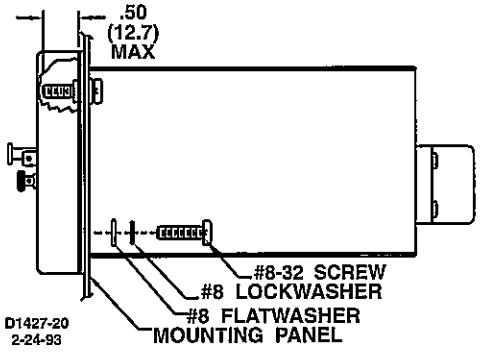
(Rear of panel)



TOP VIEW



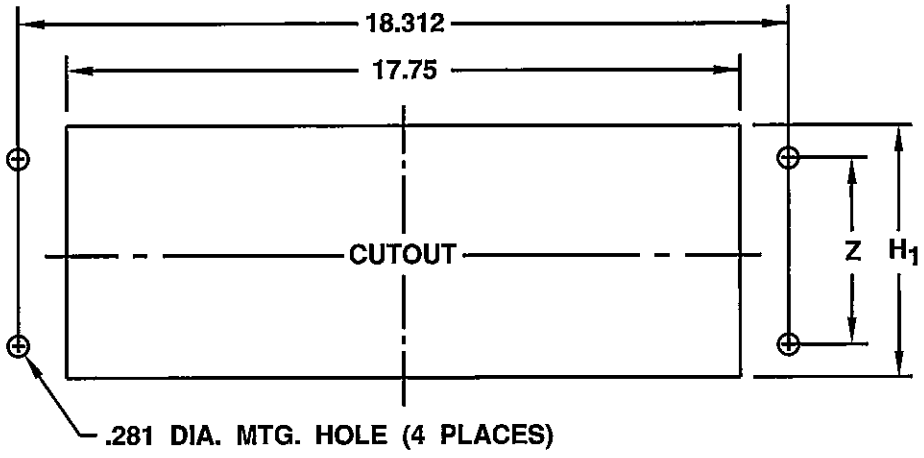
REAR VIEW



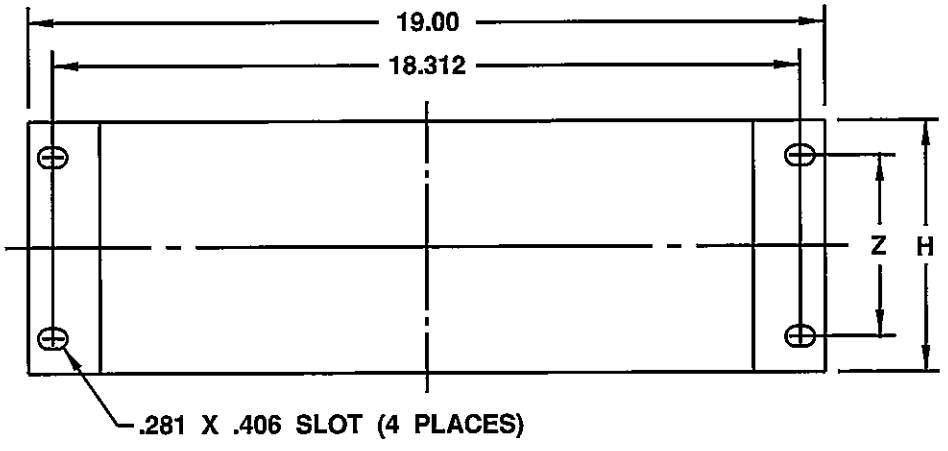
SIDE VIEW

RACK MOUNT
DIMENSIONS AND DRILLING DIAGRAM

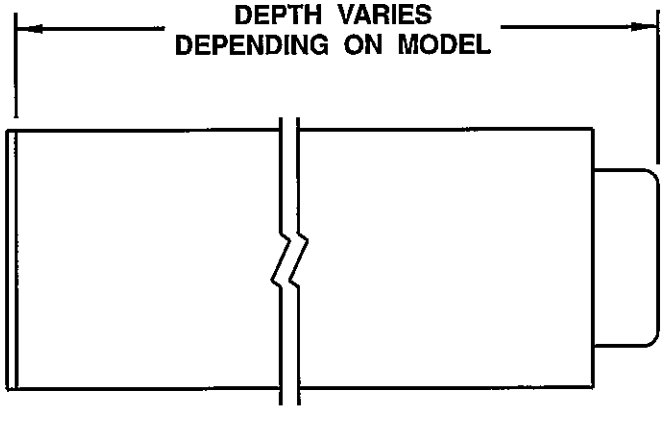
Relays may be mounted at any convenient angle.



FRONT VIEW



DRILLING DIAGRAM
(Rear of panel)



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SIDE VIEW

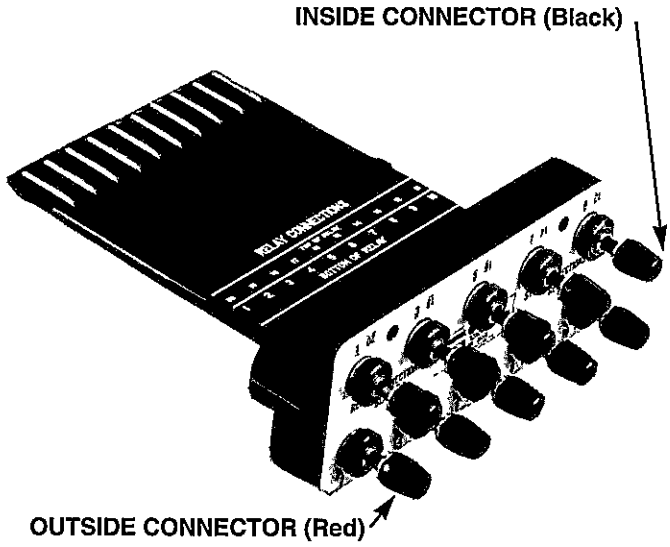
NOTES:
1) DIMENSION H = 1.750 x n $^{+0}_{-0.031}$
   n = NUMBER OF STANDARD RACK UNITS.
2) TOLERANCE TO BE ±0.015 UNLESS OTHERWISE SPECIFIED.
   TOLERANCES TO BE NON-CUMULATIVE.
   TOLERANCE BETWEEN ANY TWO SLOTS ±0.015.

DIMENSION TABLE FOR RACK MOUNTED UNITS			
n	H	Z	H_1
2	3.469	3.000	3.600
3	5.219	2.250	5.350
4	6.969	4.000	7.100
5	8.719	5.750	8.850

RELAY ACCESSORIES

ACCESSORIES

The Basler Electric Company offers several accessories to aid in the testing, calibrating and troubleshooting of protective relays. The accessories available though Basler Electric are described in the paragraphs that follow.



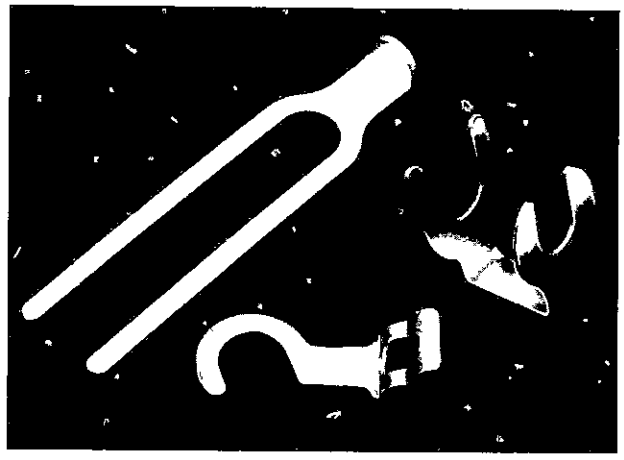

LINKS AND TEST CLIPS

FIGURE 2. TEST PLUG AND ACCESSORIES

TEST PLUG P/N 10095 (FIGURE 2)

The test plug provides a quick, easy method of testing drawout case type relays without removing them from their case. The test plug is simply substituted for the connecting plug with nothing left to disconnect. Insertion of the test plug enables the user access to both the external stud connections and the internal relay connections.

The test plug consists of a black and red phenolic moulding with twenty electrically separated contact fingers. The ten fingers on the black side are connected to the inside binding posts with the black thumb nuts and engage the relay's internal connections. The ten fingers on the red side of the test plug are connected to the outside binding posts with the red thumb nuts and engage the relay case external stud connections.

When testing circuits connected to the bottom set of case terminals, the test plug will be inserted with the numbers 1 through 10 displayed in an upright manner. Likewise, when using the test plug in the upper part of the relay, the numbers 11 through 20 are displayed in an upright manner. It is impossible, due to the construction of the test plug, to insert it upside down.

Links and test clips are provided with each test plug to faciliate any test connections required.

EXTENDER CARD (FIGURES 3 AND 4)

The extender card permits calibration and trouble shooting of the individual printed circuit boards outside of the drawout cradle assembly.

There are two extender card versions available to suit the user's particular need. Extender card, P/N 9 1129 30 101 (Figure 3), is keyed to fit Basler relay mother-

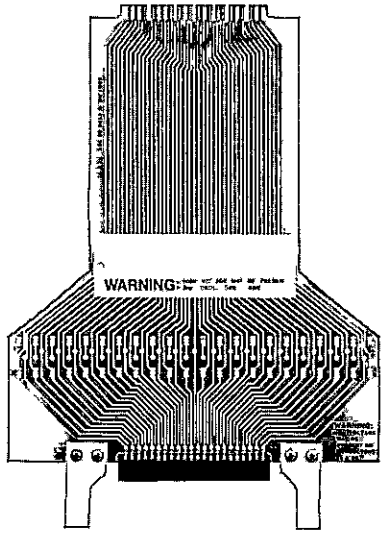


FIGURE 3

RELAY ACCESSORIES
(CONTINUED)

board locations, and comes with numbered terminals for easy identification of particular circuits to be tested.

In operation, the printed circuit board to be calibrated or tested is removed from the cradle assembly and attached to the extender card connecting plug. The entire assembly (pc board and extender card) is then inserted into the vacated slot of the cradle assembly. All tests and adjustments can then be performed with ease.

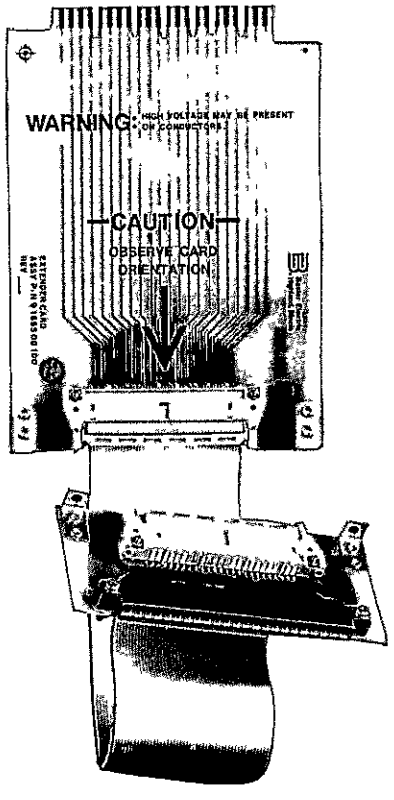


FIGURE 4

Extender card, P/N 9 1655 00 100 (Figure 4) is also keyed to fit motherboard locations. The desirable feature of this extender card is its two part construction which connects one half of the board (with ribbon cable) to the other half. This allows the pc board to be placed on the workbench for easier access to both sides of the PC board. The operation is the same as that described above.

BENCH TEST FIXTURE

A test fixture is available which consists of a cutaway case that includes a terminal block. This fixture was expressly designed for testing, without confinement, the relays that come in an A1 case. (These relays cannot use an extender card). The bench test fixture can be used with the M1 and S1 cases.

Order Basler part number 9 2011 11 100. Includes extra paddle. Two test fixtures are required for double-ended relays (i.e., for 20-terminal cases).

CONTACT SENSING MODULES

Contact sensing modules are required with relays having contact inputs, and power supplies rated for either 250 Vdc or 230 Vac. (Types T, X and Z). These modules are designed to dissipate the excessive heat generated by the contact sensing circuits external to the relay, thereby keeping this energy outside of the relay case.

There are twelve input sensing modules available for use with the BE1 relay models. Six modules are available for relay styles with isolated contact sensing inputs and six modules are available for relay styles with non-isolated contact sensing inputs. The specific module required by a specific style relay is determined by the number of contacts that must be sensed by the device, and whether the relay uses an isolated contact (the control circuit voltage is ac) or the relay uses a non-isolated contact (the control circuit is dc). In the former case (isolated sensing), the relay supplies the required dc voltage to the contact for sensing.

MODULE SELECTION CHART

Number of Contact Inputs	Part Number of Contact Sensing Module	
	For Isolated Contact Sensing	For Non-Isolated Contact Sensing
1	9 1702 06 105	9 1702 06 111
2	9 1702 06 104	9 1702 06 110
3	9 1702 06 103	9 1702 06 109
4	9 1702 06 102	9 1702 06 108
5	9 1702 06 101	9 1702 06 107
6	9 1702 06 100	9 1702 06 106

Complete module specifications, mounting and outline dimensions, connection information and schematic diagrams for each of the above modules is contained within the Input Sensing Module Instruction Manual 9 1702 06 990 which is included with the module when shipped.

Basler Electric

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