Hold In Unit

Restarting Relay

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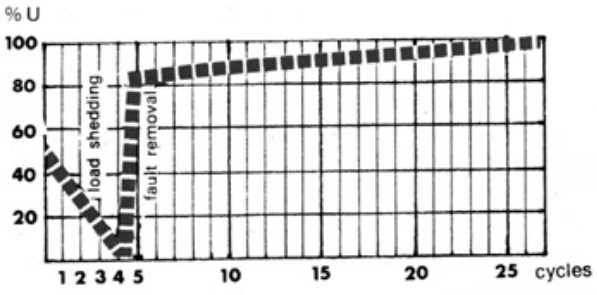
SOLCON

INTRODUCTION

Minimizing plant upsets and ensuring maximum continuity of operation is essential in many modern industrial processes and systems. The **HOLD-IN UNITS** have been developed to ensure that critical motors will continue to operate despite disturbances in the power supply. The most common disturbances to the continuous operation of industrial plants are transient voltage dips and short duration voltage outages in the main power supply which are caused by:

- Faults in the high or medium voltage supply system which are usually cleared by their protective devices within five cycles (100 mSec. at 50 Hz).
- Voltage outages of 200 to 400 mSec. caused by the tripping open on fault and automatic reclosing of the feeder breaker on the transmission and distribution systems.
- Voltage outages of 1 Sec. or more occurring when the power supply is transferred to a standby source.



Effect of fault, load shedding and fault removal on bus voltage

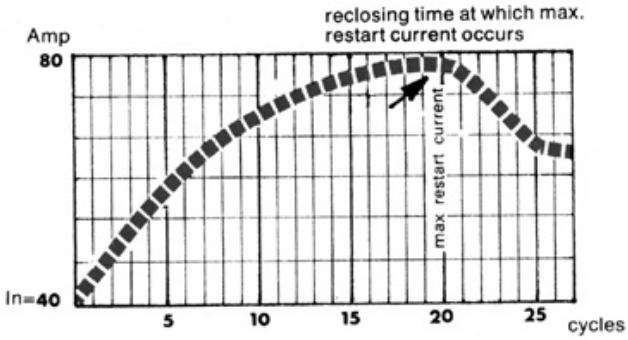
Upon interruption of the power supply the motors maintain a self-generated power (Back EMF) of diminishing amplitude and frequency. In the absence of isolating devices, the whole system will remain operative for some time with the motor starters held-in by the Back EMF. During interruptions, high inertia devices tend to "float" low inertia devices, for a short time, until the starters begin to drop-out when the Back EMF decreases below coil's voltage. The returning supply voltage can be in phase opposition to the Back EMF depending on outage duration, motor size and loading. Restarting in phase opposition would cause momentary high inrush currents of up to 25 times nominal current as well as restrike stress. In order to restart those motors which have dropped out, a device is required which will reclose the starter under the most favourable conditions.

The **HOLD-IN UNITS** are intended to automatically restart motors following short duration voltage dips or outages. The restarting will be immediate or delayed depending on voltage dip duration.

IMMEDIATE RESTARTING is provided at voltage dips of less than 100 mSec. as the slippage of the motors will not have increased beyond the point where undesirable inrush currents would occur.

DELAYED RESTARTING is provided at voltage outages exceeding 100 mSec. as the restored power supply may be in partial or complete phase opposition to the Back EMF generated by the motors. Restarting will be delayed until the residual Back EMF has sufficiently diminished.
Simultaneous restarting of all motors, which would result in undesirable inrush currents, can be prevented by staggering the restarting of the motors.

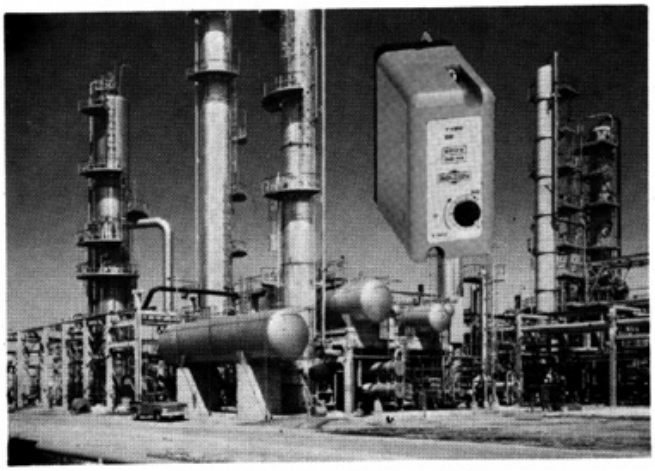
NO RESTARTING is provided if the outage exceeds 4 seconds, for safety reasons.



Restart current as a function of outage duration for 25 kW fully loaded motor

FEATURES

—Reduction of "plant upsets" which will result in prevention of costly production losses.
—Delayed staggered restarting of motors to prevent simultaneous starting of all motors.
—Does not affect normal operation of motor.
—Reliable operation.
—Plug-in rugged housing, simple installation and connection to existing motor control circuit.
—Does not require additional power supply, low consumption.



APPLICATIONS

—Oil refineries
—Chemical and petrochemical plants
—Steel mills
—Sugar refineries
—Plastic, paper and textile industries
—Unattended stations

AUTOMATIC RESTART TIMING

The restart operation varies for different durations of voltage dips.

DURATION OF VOLTAGE DIP OR OUTAGE	AUTOMATIC RESTART TIMING
Up to 100 mSec.	Immediate Restart —on voltage restoration
100 mSec. to 4 Sec. *	Delayed Restart —externally adjustable 1-30 Sec. from voltage restoration
Exceeding 4 Sec.	No Restart —(renewed manual starting required).

* Other voltage dip durations can be supplied by special order.

The Hold-In Units will initiate a restart signal following two consecutive voltage dips of no longer than 100 mSec. each with maximum charging time of 10 Sec. after first restart.
The time delay of the automatic restart can be adjusted to allow an adequate decrease of the Back EMF to ensure satisfactory restarting under the most adverse conditions and in staggering of the restart time of the individual motors.

UNDERVOLTAGE DETECTION

Undervoltage detection level at 65% of nominal voltage. Voltage restoration detection level when voltage rises above 85% of nominal.
Units type **DE, DESS + DESRS** are equipped with an undervoltage detection system which prevents automatic restarting of the motor, as long as the restored voltage level remains below 85% of nominal.
Units type **DSS + DSRS** are equipped with an undervoltage detection system which prevents remote start as long as the main voltage level remains below 85% of nominal.

OPERATON

Hold-In Units enable two different modes of operation:
MANUAL OPERATION — manual Start Stop push button operation.
MANUAL OR REMOTE OPERATION — either manual Start Stop push button or remote centralised 28V/DC control through internal pilot relays.

All remote Start push buttons are of the N.O. type. The remote Stop push button can be either of the N.O. or N.C. types (see Selector Guide). The use of N.C. remote Stop push button is recommended for its "Fail Safe" feature. Activation of the remote Start push button immediately starts the motor except during "Restart Time Delay Interval" during which the remote Start command is blocked until completion of the time delay interval. Activation of either the remote or local manual Stop push button or the operation of the overload contact will cause immediate tripping of the starter. Even a short duration Stop command will suffice to deplete the internally stored energy and prevent undesired automatic restart. The Restart Relays become operative within 15 Sec. from starter closure (except for types DSS + DSRS which are immediately operative).

DE unit — Incorporates Automatic Restart and Undervoltage Detection and is adapted for Manual start stop operation.

DESS unit — Incorporates Automatic Restart and Undervoltage Detection and is adapted for Manual and Remote centralised operation. This unit is suitable for operation with a N.C. Stop push button (for a N.O. Stop push button add suffix **'R' — DESRS**).

DSS unit — Incorporates Undervoltage Detection and is adapted for Manual and Remote Centralised operation. This unit is suitable for operation with a N.C. Stop push button (for a N.O. Stop push button add suffix **'R' —DSRS**).

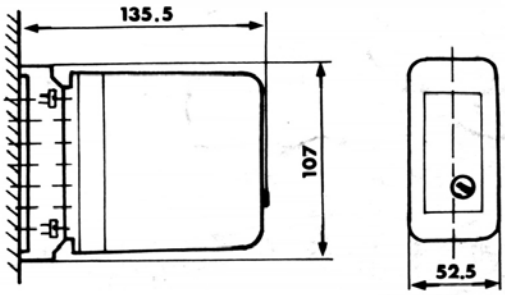
SELECTOR GUIDE

TYPE	UNDERVOLTAGE DETECTION	AUTOMATIC RESTART	MANUAL OPERATION	24V DC REMOTE PUSH BUTTON OPERATION		
				REMOTE START N.O CONTACT	REMOTE STOP	
					N.O CONTACT	N.C CONTACT
DE	+	+	+	–	–	–
DESS	+	+	+	+	+	–
DESRS	+	+	+	+	–	+
DSS	+	–	+	+	+	–
DSRS	+	–	+	+	–	+

TECHNICAL DATA

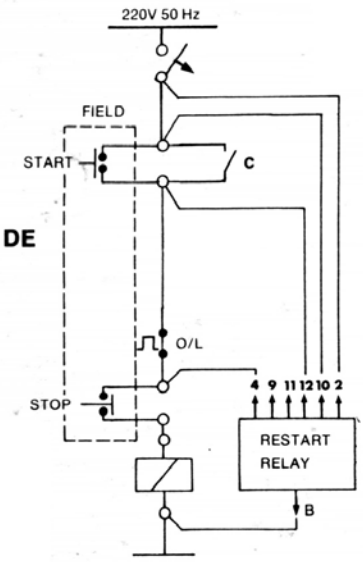
Rated voltage (starter's coil voltage)	220V±10% (other voltages can be supplied by special order)
Frequency	50 Hz
Remote control voltage	24-28 VDC
Voltage dip detection level	65% Un ±5%
Voltage restoration detection level	85% Un±5%
Max. voltage dip duration for immediate restart	100 mSec
Max. voltage dip/outage duration for delayed restart	4 Sec ±10% internally adjustable
Restarting delay time from voltage restoration	1-30 Sec ±10% externally adjustable
Minimum duration of units output closure pulse	100 mSec ± 10%
Max. reactivation time interval	15 Sec
Minimum number of subsequent restarts	2
Max. charging time after first restart	10 Sec
Switching voltage	250V R.M.S.
Switching-on current	10 Amp. 2000VA
Internal heat dissipation	1.5 W
Max. ambient temperature	50 degrees C
Max. relative humidity	90%
Life expectancy	20,000 switching operations
Mounting position	Any
Enclosure	Dust proof IP 40 (IEC 529, DIN 40050)

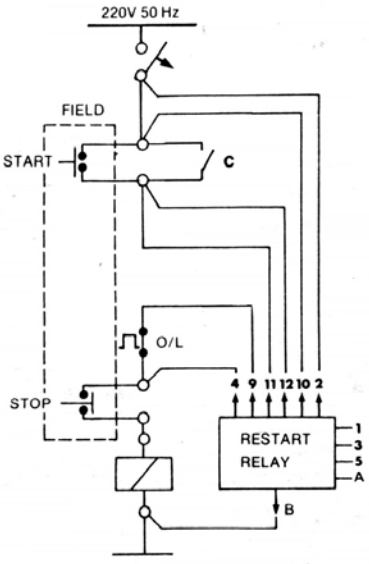
DIMENSIONS (In mm)



WIRING DIAGRAM

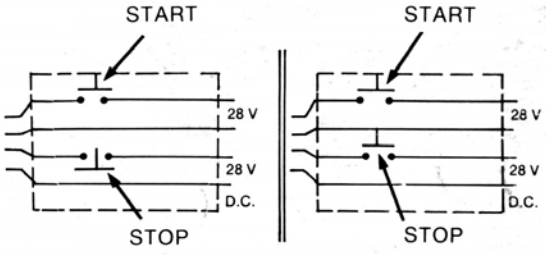
DE





DESS, DSS **DESRS, DSRS**

REMOTE



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