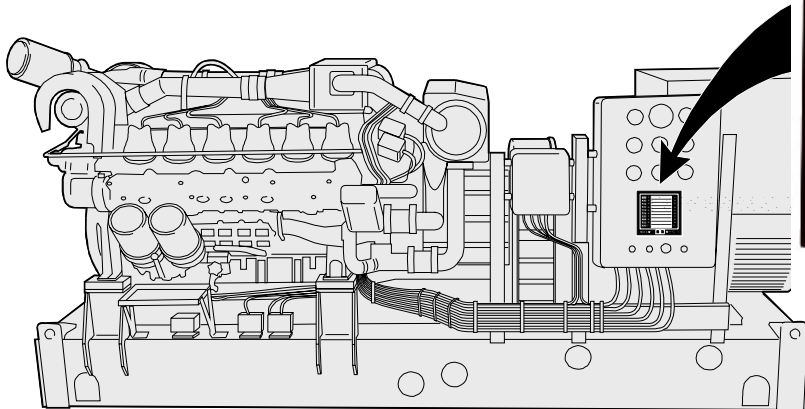


Integrated control and protection of diesel and gas engines for all purposes



Especially suited for auxiliary generator sets

- ★ Type approved by following marine classification societies: Lloyd's Register of Shipping, Germanischer Lloyd, Bureau Veritas, Romanian Register of Shipping, Polish Register of Shipping, Maritime Register of Shipping (Russia), Croatian Register of Shipping, Det Norske Veritas and RINA. Others continuously in process.
- ★ Compact unit for switchboard front panel mounting with standard instrument dimensions of 144 x 144 and a depth of only 35 mm.
- ★ Contains 9 shutdown channels and/or 7 alarm channels selectable.
- ★ Two powerful LEDs for each of the 10 indicating channels with windows for identification.
- ★ CE mark according to EN 50081 and 50082

- ★ Internal tacho relay and programmable check of external circuit.
- ★ Quick installation by means of clamping fittings and plug-in terminal blocks for easy service.
- ★ Microcomputer based circuit designed for high noise immunity and high supply voltage variations.
- ★ Contains automatic test function and control of intermittent prelubrication of engine.
- ★ The blank legend card can be typed or printed and inserted between the front plates as illustrated.
- ★ Auxiliary options: Battery back-up M0100. Tachovoltage detector M0500. Watertight cover M0800. Serial bus interface for connection to the N0300 PC Process Logger system. PC programmer N0500 for expanding the number of programming options.

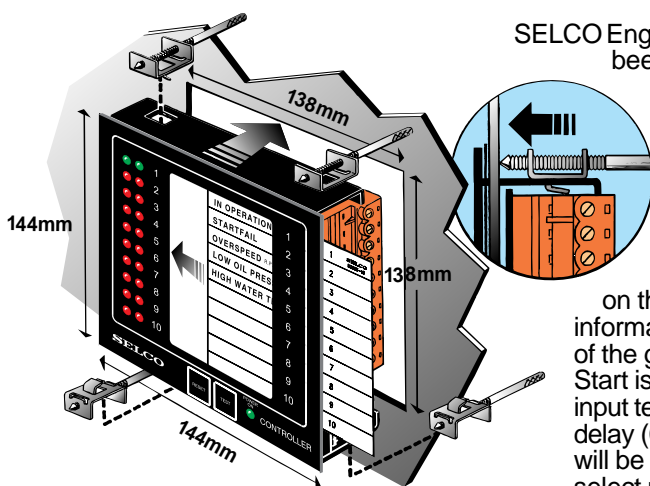
Functions

SELCO Engine Controller M2000 has been designed to take care of the complete control of a diesel generator. It controls start and stop of the engine, monitors and protects the engine during start and operation, and simultaneously indicates on the front all necessary information about the conditions of the generator set.

Start is obtained by activating input terminal 2 and after start delay (0.5-2-4-10 secs) the start will be initiated. It is possible to select up to 4 start attempts, with both crank and rest periods

adjustable (5-7-10-15 secs). When the engine fires, terminal 9 will be activated from an external tacho relay (crank disconnect) or the internal tacho unit detects in excess of 33% of the nominal frequency, and the cranking will be disconnected. When stopping the engine by deactivating terminal 2, a generator circuit breaker trip delay is available (0-0.5-1-3 min.). Finally a shutdown delay is available for cooling purposes (0-2-4-10 min.). The stated sequence times are standard, but can be altered to suit using SELCO PC programmer N0500. Besides above main functions the controller contains many other features.

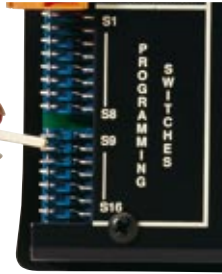
Please request data sheet no. M2096.



Quick and easy replacement of indication label



Programming switches



Programming table:

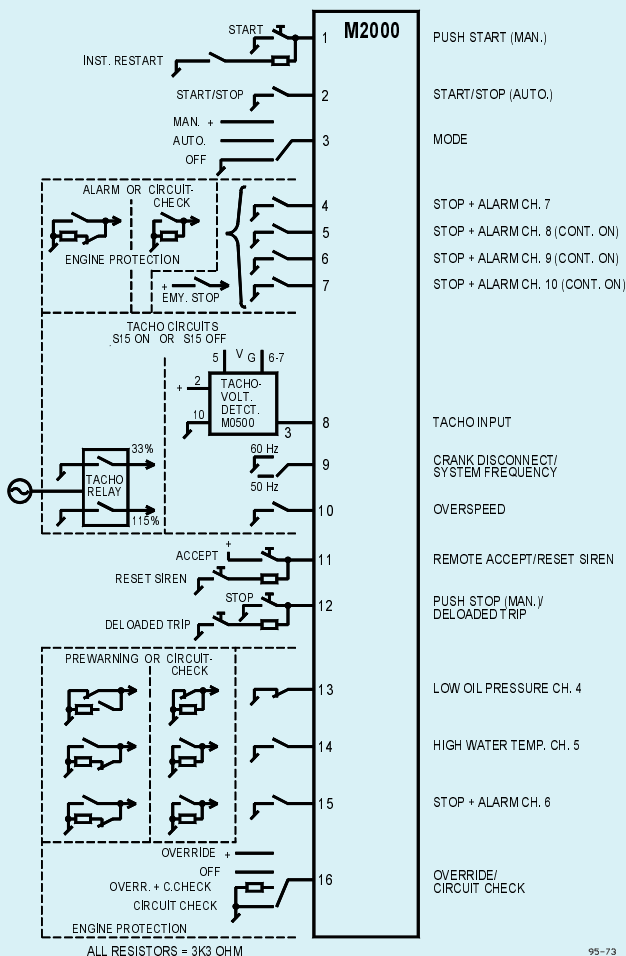
Start attempts				
	1-	2-	3-	4 attempts
S1	on	off	on	off
S2	on	on	off	off

Crank time				
	5-	7-	10-	15 secs
S3	on	off	on	off
S4	on	on	off	off
Rest time				
	5-	7-	10-	15 secs
S5	on	off	on	off
S6	on	on	off	off
Start delay (start warning)				
	0.5-	2-	4-	10 secs
S7	on	off	on	off
S8	on	on	off	off
Stop time				
S9	on = 20 secs			
S9	off = 50 secs			
Puls start-stop (term. 1+12)				
S10	on = continuous push			
S10	off = puls			

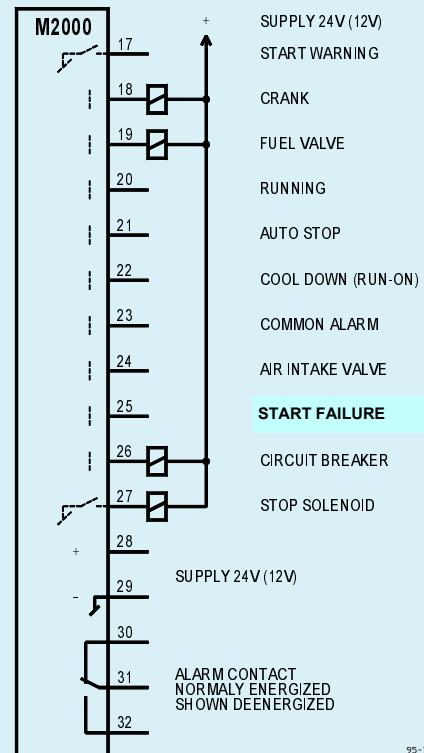
Circuit breaker trip				
	0-	0.5-	1-	3 min.
S11	on	off	on	off
S12	on	on	off	off
Cool down				
	0-	2-	4-	10 min.
S13	on	off	on	off
S14	on	on	off	off
Tacho detection				
S15	on = external tacho relay			
S15	off = SELCO M0500 installed			
Starter engagement protection				
S16	on = no function			
S16	off = S.E.P. + start via oil pres.			
Push-buttons				
Start - stop accept-reset-lamp test				

Example of programming of delay:
S7 off and S8 on will provide start delay of 2 secs

Input terminals



Output- and supply terminals



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Meterbuen 6-12
DK-2740 Skovlunde
Telephone: +45 -44 91 11 22
Telefax: +45 -44 91 25 22
<http://www.selco.com>

Great Britain:
13 Orton Enterprise Centre
Bakewell Road, Orton Southgate
Peterborough PE2 6XU
Telephone: +44 (0) 1733 371828
Telefax: +44 (0) 1733 361434

Inputs

Terminal 1: PUSH START / INSTANT RESTART
(Is active only in manual mode). NO contact to minus. Cranking is obtained as long as 1 is activated, and crank is disconnected by receiving crank disconnect signal. Several start attempts and start failure are not in function. With S10 OFF, an 0.2 sec. signal on terminal 1 gives start, and start failure and more start attempts are active. Is 1 connected to minus via 3,3 KOHM, start in the stop periode is obtained. The fuel valve will open and the stop coil released but cranking is only possible after the stop time has passed.

Terminal 2: START / STOP
(Is active only in automatic mode). NO contact to minus. By activation the engine is started, and by deactivation the engine is stopped.

Terminal 3: MODE
An external 3-position switch is connected here. MANUAL (MAN.). Is obtained by connecting terminal 3 to plus, and in that position start and stop can be performed via the push button on the front, and via the terminals 1 and 12. AUTOMATIC (AUT.). With terminal 3 open, automatic start and stop is obtained by activating or deactivating terminal 2. OFF. Is obtained by connecting terminal 3 to minus, and in this position the engine is stopped and blocked for start.
WARNING : Is OFF considered as safety switch-off, then 18 (CRANK) must also be disconnected.

Terminal 4: STOP + ALARM CHANNEL 7
NO contact to minus. The input is enabled 8 sec. after crank disconnect. This channel can be used for any engine protection or alarm function. Gives shut-down, alarm, and fast flashing on LED 7. Contains possibility of circuit check or alarm by disconnecting 3,3 KOHM across the contact and input 16 to minus. Circuit failure or alarm gives slow flashing.

Terminal 5: STOP + ALARM CHANNEL 8
NO contact to minus. Shut-down is enabled 8 sec. after crank disconnect. Alarm is in operation with engine not running. This channel can be used for any motor protection or alarm function. Gives shut-down, alarm, and fast flashing on LED 8. Contains possibility of circuit check or alarm by disconnecting 3,3 KOHM across the contact and input 16 to minus. Circuit failure or alarm gives slow flashing. Indication without any logical function is obtained with input to plus.

Terminal 6: STOP + ALARM CHANNEL 9
NO contact to minus. Shut-down is enabled 8 sec. after crank disconnect. Alarm is in operation with engine not running. This channel can be used for any motor protection or alarm function. Gives shut-down, alarm, and fast flashing on LED 9. Contains possibility of circuit check or alarm by disconnecting 3,3 KOHM across the contact and input 16 to minus. Circuit failure or alarm gives slow flashing. Indication without any logical function is obtained with input to plus.

Terminal 7: STOP + ALARM / EMERGENCY STOP CHANNEL 10. NO contact to minus. Shut-down is enabled 8 sec. after crank disconnect. Alarm is in operation with engine not running. This channel can be used for any motor protection or alarm function. Gives shut-down, alarm, and fast flashing on LED 10. Contains possibility of circuit check or alarm by disconnecting 3,3 KOHM across the contact and input 16 to minus. Circuit failure or alarm gives slow flashing. Emergency stop with shut-down and blocking is obtained with input 7 to plus. This functions is also active with engine not running.

Terminal 8: TACHO INPUT
Here the generator frequency is measured via the attached tacho detector M0500 if contact S15 is activated. 33% on the nominal frequency (system frequency 50 or 60 Hz chosen on terminal 9) is crank disconnect, and 115% is over-speed. The first 8 sec. after start the limit is 120%.

Terminal 9: CRANK DISCONNECT / SYSTEM FREQUENCY. NO contact to minus. With programming contact S15 ON, an external contact signal for disconnecting cranking can be connected here, for instance a tacho relay indicating that the engine is running. If the programming contact S15 is OFF, the internal tacho function is active with tacho detector M0500, and the system frequency is programmed on this terminal as follows :
9 to minus = 60 Hz, 9 open = 50 Hz.

Terminal 10: OVERSPEED
NO contact to minus. Here an external tacho relay set for the engine overspeed is connected. Will give shut-down, and flashing on LED 3 labelled "OVERSPEED". This input terminal is active independent of S15 position. In connection with tacho detector M0500 overspeed level 100% for test is obtained with terminal 10 to plus.

Terminal 11: REMOTE ACCEPT / RESET / LAMP TEST. Two functions are obtained on this input in connection with failures on the engine. The input connected to minus via a 3,3 kOHM will disconnect the siren. The input connected to plus directly will reset the alarm and release the blocking allowing the engine to start again, provided the siren is disconnected. The input connected to minus gives disconnection of siren and alarm reset.

Terminal 12: PUSH STOP / DELOADED TRIP
Two functions are obtainable. NO contact to minus. The engine is stopped as long as 12 is activated. Is active only in manual mode. With S10 disconnected an 0.2 sec. impulse on terminal 12 will give continuous stop. Engine stop will be delayed if circuit breaker trip delay and cool down time functions are selected, and all automatic functions are obtainable. Is 12 connected to minus via 3,3 kOHM deloaded trip is obtained to be used on parallel running generator. 1.5 sec. after engine stop the load is small and the generator circuit breaker is tripped via output 26.

Terminal 13: LOW OIL PRESSURE.
STOP + ALARM CHANNEL 4. NO contact to minus. The input is enabled 8 sec. after crank disconnect. Here a lubrication oil pressostat is connected. Gives shut-down and fast flashing on LED 4 labelled "LOW OIL PRESSURE". Contains possibility of circuit check or pre-alarm by disconnecting 3,3 kOHM across the contact and by connecting input 16 to minus. To ensure start by emergency generators and to avoid that the starter can be engaged when the motor is running alternative start disconnecting signal is available via this input. With S16 open - after each start attempt, before a new start attempt - the oil pressure is checked. Is there an oil pressure the motor must be running and cranking will be avoided. If the oil pressure goes low within 30 sec. starting will proceed otherwise an alarm and a R.P.M.-failure indication are given to show that the tachometer input is out of order and that the over-speed protection may be out of function.

Terminal 14: HIGH WATER TEMPERATURE.
STOP + ALARM CHANNEL 5. NO contact to minus. The input is enabled 8 sec. after crank disconnect. Here a cooling water thermostat is connected. Gives shut-down and fast flashing on LED 5 labelled "HIGH WATER TEMPERATURE". Contains possibility of circuit check or pre-alarm by disconnecting 3,3 kOHM across the contact and by disconnecting 16 to minus.

Terminal 15: STOP + ALARM CHANNEL 6
NO contact to minus. The input is enabled 8 sec. after crank disconnect. This channel can be used for any motor protection or alarm function. Gives shut-down, alarm, and fast flashing on LED 6. Contains possibility of circuit check or alarm by disconnecting 3,3 kOHM across the contact and input 16 to minus. Circuit failure or alarm gives slow flashing.

Terminal 16: OVERRIDE / CIRCUIT CHECK
Programming terminal with two functions.

1. Override means that engine protection (shut-down) connected to terminals 4, 5, 6, 7, 13, 14, and 15 is out of function. To be used in situations where stop cannot be accepted or where supply is necessary in spite of a failure.
2. Circuit check demands a resistor 3,3 kOHM installed directly across the monitoring contacts connected to terminals 4, 5, 6, 7, 13, 14, and 15. A small current will now run in the circuit, and is circuit check active and is this small current disconnected, it will be indicated on the appropriate channel with slow flashing together with an alarm signal. This circuit can also be used for pre-alarms, with the same name as labelled on the front, by installing a normally closed alarm contact in series with the resistor.

Programming :

16 to plus gives override.

16 to minus gives circuit check.

16 to minus via 3,3 kOHM gives both override and circuit check.

16 open excludes both functions.

Outputs

Terminal 17: START WARNING
A start signal on terminal 1 or 2 immediately activates start warning and it appears again before any new start attempt with a duration as set on S7 and S8 START DELAY (START WARNING). Is used for warning before automatic start. Preglow is obtained by connecting terminal 17 and terminal 18 via two diodes. (See attached application diagram).

Terminal 18: CRANK
Is activated in the cranking sequence. Here a relay is connected, which activates the engine starter.

Terminal 19: FUEL VALVE
Here a relay is connected which will control the diesel engine fuel valve, meaning that it is active, as long as the engine starts and runs, and will be deactivated at stop of the engine (Energized to run).

Terminal 20: RUNNING

Becomes active after receiving crank disconnect signal and deactivates at motor stop. Can be used to enable an external alarm panel M1000 for pre-alarms.

Terminal 21: AUTO STOP

Becomes active at all fails, which give shut-down on the engine.

Terminal 22: COOL DOWN

Is active during cool down and stop solenoid function. To be used for disabling automatic synchronization or for idling.

Terminal 23: COMMON ALARM

Becomes active when activating the alarm system, i.e. all protection shut-downs including start failure, all alarms or circuit checks and R.P.M.-failure. Is continuously ON but disconnected for 1 sec. with new alarms arriving.

Terminal 24: AIR INTAKE VALVE

Becomes active at shut-down for overspeed and emergency stop. Is used for alternative stop on some engines. The output goes back by reset.

Terminal 25: START FAILURE:

Becomes active when all start attempts in auto mode have been accomplished without crank disconnect signal being received.

Terminal 26: CIRCUIT BREAKER TRIP

Delivers a 5 sec. impulse for disconnecting the generator circuit breaker. It appears before cool down (run on) where the circuit breaker is disconnected, to unload the engine.

Terminal 27: STOP SOLENOID

Becomes active for 20 sec. or 50 sec. (selected on S9) when the engine is stopped. Is used for activation of the engine's stop solenoid.

Terminal 28: + SUPPLY

Positive supply of 12 or 24V DC.

Terminal 29: - SUPPLY

Negative supply of 12 or 24V DC.

Terminal 30, 31 and 32: ALARM CONTACT

Separate contact for siren. Relay normally activated. Without supply voltage or by failures there will be contact between 30 and 31. Under normal conditions with supply voltage connected there will be contact between 31 and 32.

Front Plate

LED 1: IN OPERATION

Flashes slowly during start delay, start rest, circuit breaker trip, cool down and in the stop period. Flashes fast in crank period. Gives steady light after receiving crank disconnect signal.

LED 2: START FAILURE

Flashes when all start attempts have been accomplished without crank disconnect signal being received.

LED 3: OVERSPEED (R.P.M. FAIL)

Flashes for overspeed by activating input 10 or if the frequency on input 8 exceeds 115%. Goes on steady light for R.P.M.-failure if input 9 is disconnected or if the frequency on input 8 passes below 25% without a stop signal being received. R.P.M.-failure means either unwanted engine stop or failure in the speed detection which indicates that the overspeed protection is perhaps not active. LED 3 goes on steady light if the engine is started via the oil pressure signal (S16 ON).

LED 4: LOW OIL PRESSURE

Flashes fast by activation of input terminal 13. If circuit check is used, circuit failure or alarm gives slow flashing. Reset gives steady light.

LED 5: HIGH WATER TEMPERATURE

Flashes fast by activating input terminal 14. If circuit check is used, circuit failure or alarm gives slow flashing. Reset gives steady light.

LED 6: STOP + ALARM

Flashes fast at activation of input 15. Contains possibility of circuit check or alarm giving slow flashing indication. Reset gives steady light.

LED 7: STOP + ALARM

Flashes fast at activation of input 4. Contains possibility of circuit check or alarm giving slow flashing indication. Reset gives steady light.

LED 8: STOP + ALARM

Flashes fast at activation of input 5. Contains possibility of circuit check or alarm giving slow flashing indication. Reset gives steady light.

LED 9: STOP + ALARM

Flashes fast at activation of input 6. Contains possibility of circuit check or alarm giving slow flashing indication. Reset gives steady light.

LED 10: STOP + ALARM

Flashes fast at activation of input 7. Contains possibility of circuit check or alarm giving slow flashing indication. Reset gives steady light.

SINGLE GREEN POWER LED:

Will indicate when 24V or 12V supply is connected.

PUSH BUTTON START / STOP:

Every second time it is pushed start respectively stop of the diesel engine is obtained. Only active in MAN. mode.

PUSH BUTTON ACCEPT / RESET / LAMPTEST

First push by failure disconnects the siren. Second push resets light and blocking. During activation lamp test is obtained.

Programming Switches / Back Side

Switch S1 + S2: START ATTEMPT

Here 1 - 4 start attempts can be selected

1 - 2 - 3 - 4 ATTEMPTS

S1 ON OFF ON OFF

S2 ON ON OFF OFF

Switch S3 + S4: CRANK TIME

Here the crank duration can be programmed. If only one start attempt is selected the crank duration is extended to 3 times the selected crank time.

5 - 7 - 10 - 15 SEC.

S3 ON OFF ON OFF

S4 ON ON OFF OFF

ONE START ATTEMPT = 3 x CRANK TIME

Switch S5 + S6: REST TIME

Here the time between start attempts is programmed.

5 - 7 - 10 - 15 SEC.

S5 ON OFF ON OFF

S6 ON ON OFF OFF

Switch S7 + S8: START DELAY (Start Warning).

Here the time is programmed, from input 2 is activated until the cranking begins. This is also the duration of the output on terminal 17 START WARNING.

0.5 - 2 - 4 - 10 SEC.

S7 ON OFF ON OFF

S8 ON ON OFF OFF

Switch S9: STOP TIME

Here a long or a short stop time is selected on output 27 STOP SOLENOID.

S9 ON = 20 sec. stop time.

S9 OFF = 50 sec. stop time.

Switch S10: PULSE START - STOP

Here is selected if the signals on terminal 1 START and 12 STOP and START/STOP push button on the front demands continuous signal or pulse signal.

S10 ON = constant signal.

S10 OFF = pulse signal.

Switch S11 + S12: CIRCUIT BREAKER TRIP

With the engine running the time is programmed here, from input 2 is being deactivated until the generator circuit breaker is tripped via output 26. Is used in connection with emergency generator installations, where emergency supply is wanted for a definite time after normal supply is restored.

0 - 0.5 - 1 - 3 MIN.

S11 ON OFF ON OFF

S12 ON ON OFF OFF

Switch S13 + S14: COOL DOWN TIME / RUN-ON.

Here the time is programmed where the diesel engine runs without load before it is stopped.

0 - 2 - 4 - 10 MIN.

S13 ON OFF ON OFF

S14 ON ON OFF OFF

Switch S15: TACHO DETECTION

Here the internal tacho detector can be selected with SELCO M0500 installed or external tacho- and voltage relay function.

S15 ON = EXTERNAL TACHO RELAY = 9 is crank disconnect.

S15 OFF = ADAPTED TO SELCO TACHO-VOLT. DET. M0500, 9 is for selecting 50 or 60 Hz.

Switch S16: STARTER ENGAGEMENT PROTECTION.

To obtain safe start and no cranking when the engine is running, an alternative signal from the oil pressure can be used. See input 13.

S16 ON = normal

S16 OFF = + start via oil pressure and starter engagement protection.

General Information

The outputs have built-in flywheel diodes and are further protected against short-circuit with a limitation of 1 Amp. If the current is exceeded, the appropriate output is disconnected until the output is reactivated. Incandescent lamps can activate the protection circuit, as the starting current can be 10 times the normal current, but a small bias circuit can normally solve the problem (Resistor from output to minus).

To ensure that cranking is not signalled when the motor is running, the following safety functions are included :

- 1) Is the crank disconnect signal present or is there lub. oil pressure, cranking cannot be activated.
- 2) If the crank disconnect signal disappears during run and no stop signal is received, either because the engine has been stopped directly or the tacho detection is defective, the cranking is blocked and alarm signal and steady light on overspeed is given R.P.M.-failure (indicates that overspeed protection is prospectively not present). Now the cranking cannot be allowed until the stop time has expired after receiving a stop signal. This is to ensure that the engine is stopped completely before cranking.
- 3) With S16 open it is tested - after each start attempt, before a new start attempt - if oil pressure is present. If so, the engine is either running or the oil pressure is decreasing. Therefore, if the oil pressure goes low within 30 sec. then start commences. Is oil pressure still high after 30 sec. and no crank disconnect signal is present, the engine must run and R.P.M.-failure is indicated.

Warning: It must be emphasized that the part of the engine protection signaling via the terminals 4 - 5 - 6 - 7 - 13 - 14 - 15 is disconnected at override. It is only to be used in emergency situations where stop cannot be accepted or where supply is necessary in spite of a failure.

Specifications

Voltage supply:M2000-20	: 24V +30 -75%
M2000-10:	12V +30 -30%
Power consumption on terminals 28-29	: 0.25A
Dimensions (HxWxD)	: 144 x 144 x 35 mm
For RS232 Connection	: M2000-VV-VV-B
Weight	: 500 g.
Ambient temperature range	: - 10 ^o to +70 ^o C
Output contact	: Siren 220V AC / 2A 30V DC / 2A / 30W
Outputs	: Max. 0.15A per output continuous
Noise immunity	: IEC 255, Classe 2 / SS 4361503, PL 3
Tolerance, delays	: ±2%
Tolerance, frequency measuring	: ±2%
Flashing frequency, fast	: 8 Hz
slow	: 0.8 Hz

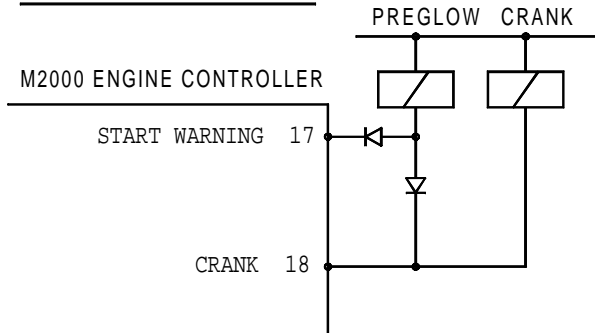


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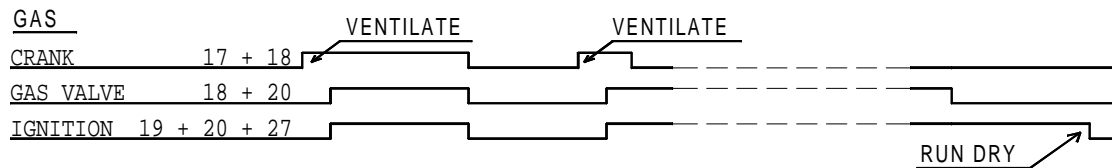
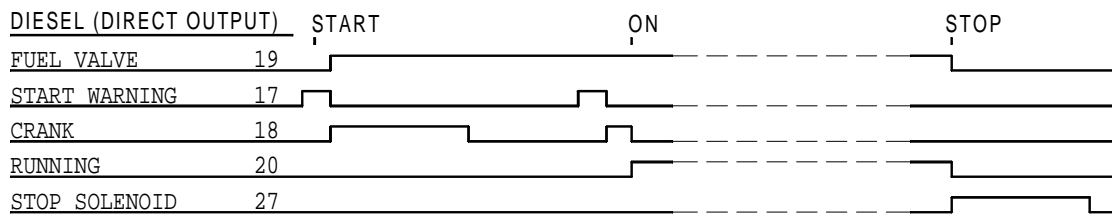
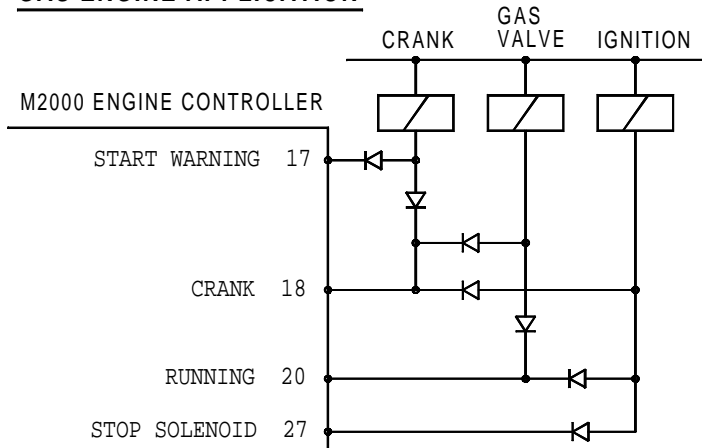
Great Britain:
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Bakewell Road, Orton Southgate
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M2000 ENGINE CONTROLLER APPLICATION

PREGLOW FUNCTION



GAS ENGINE APPLICATION



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M0795-71 E

Optional print cards M0700

M0700-00 Universal PC Board

On the rear of all M-series controllers a general useable auxiliary PC board can be connected for easy soldering of resistors and diodes to be used on both inputs and outputs.

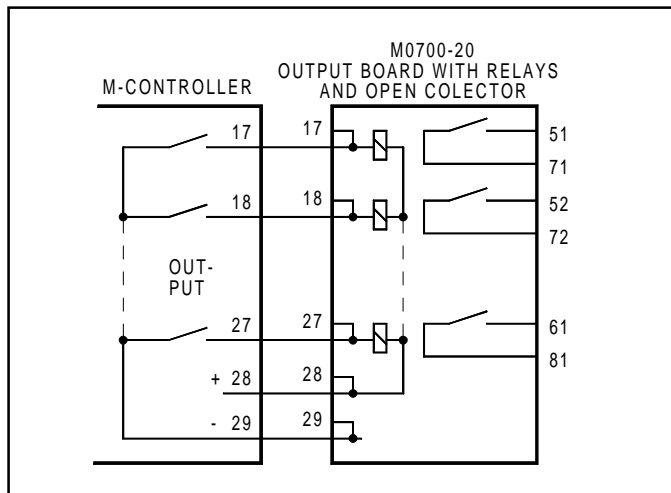
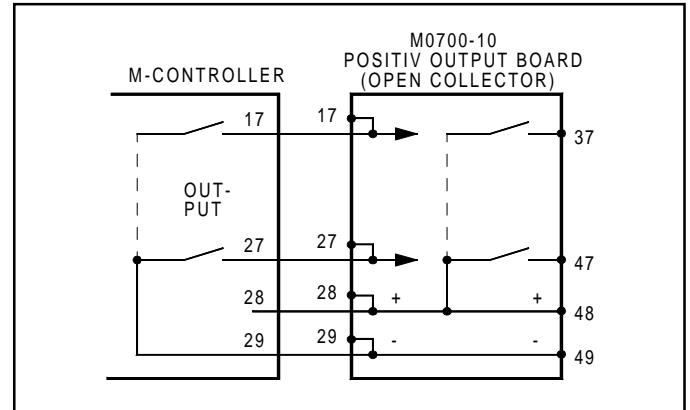
M0700-20 Relay PC Board

On the rear side of all M-series controllers a relay PC-Board can be mounted, which gives galvanic isolation between the controller and one external relay contact per channel. For channel 1 a contact is available between terminals 51 and 71, channel 2 on 52 and 72 etc.

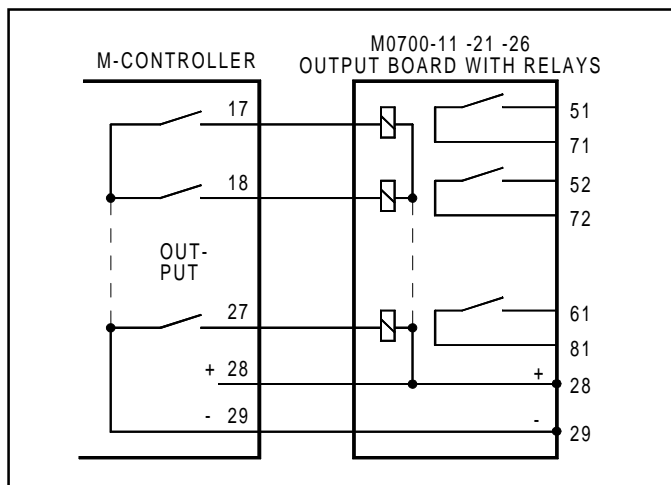
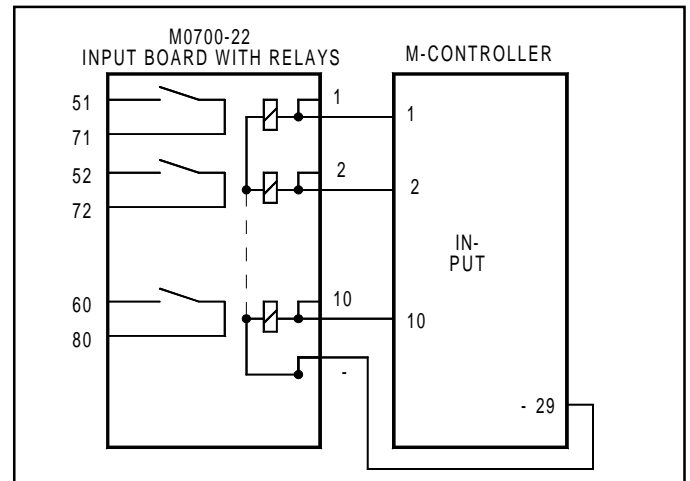
Contact specifications: AC: 125V, 1A, 60VA
DC: 150V, 1A, 30W
Isolation : 1500V

M0700-10 Positive Output PC Board

On the rear of all M-series controllers an auxiliary PC board M0700-10 can be connected. When mounted on the controllers output terminals, it changes the output from negative going to positive going. Max. 80V, Max. 0.1A.



M0700-22 Input Board



Type Selection Table

M0700-00	Universal PC Board
M0700-10	Positive output board 12V, 24V, 48V
M0700-11	Output board with relays 12V
M0700-20	Output board with relays and open collectors 24V
M0700-21	Output board with relays 110V
M0700-22	Input board with relays 48V
M0700-23	Output board with 4 relays and 11 open collectors 24V
M0700-24	Board for M0300 bus 12V, 24V, 48V
M0700-25	Board for RS-485 12V, 24V, 48V
M0700-26	Output board with relays 48V



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M0895-62 E

Cover M0800

Cover for M1000 - M2000 - M2100

IP 54

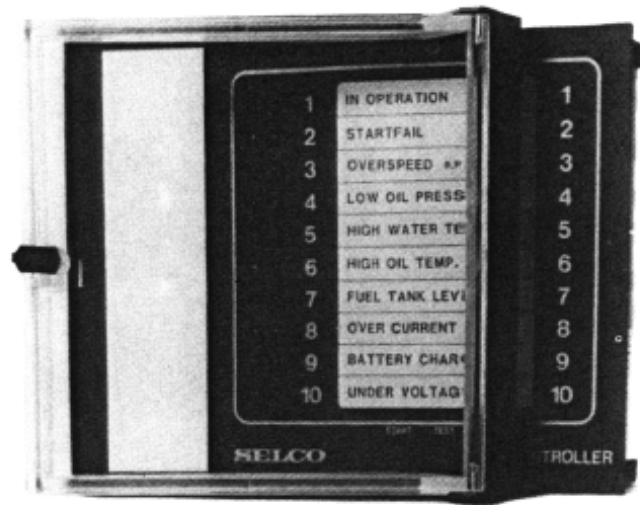
M0800-00-00 with handle

M0800-01-00 with key

For M4700

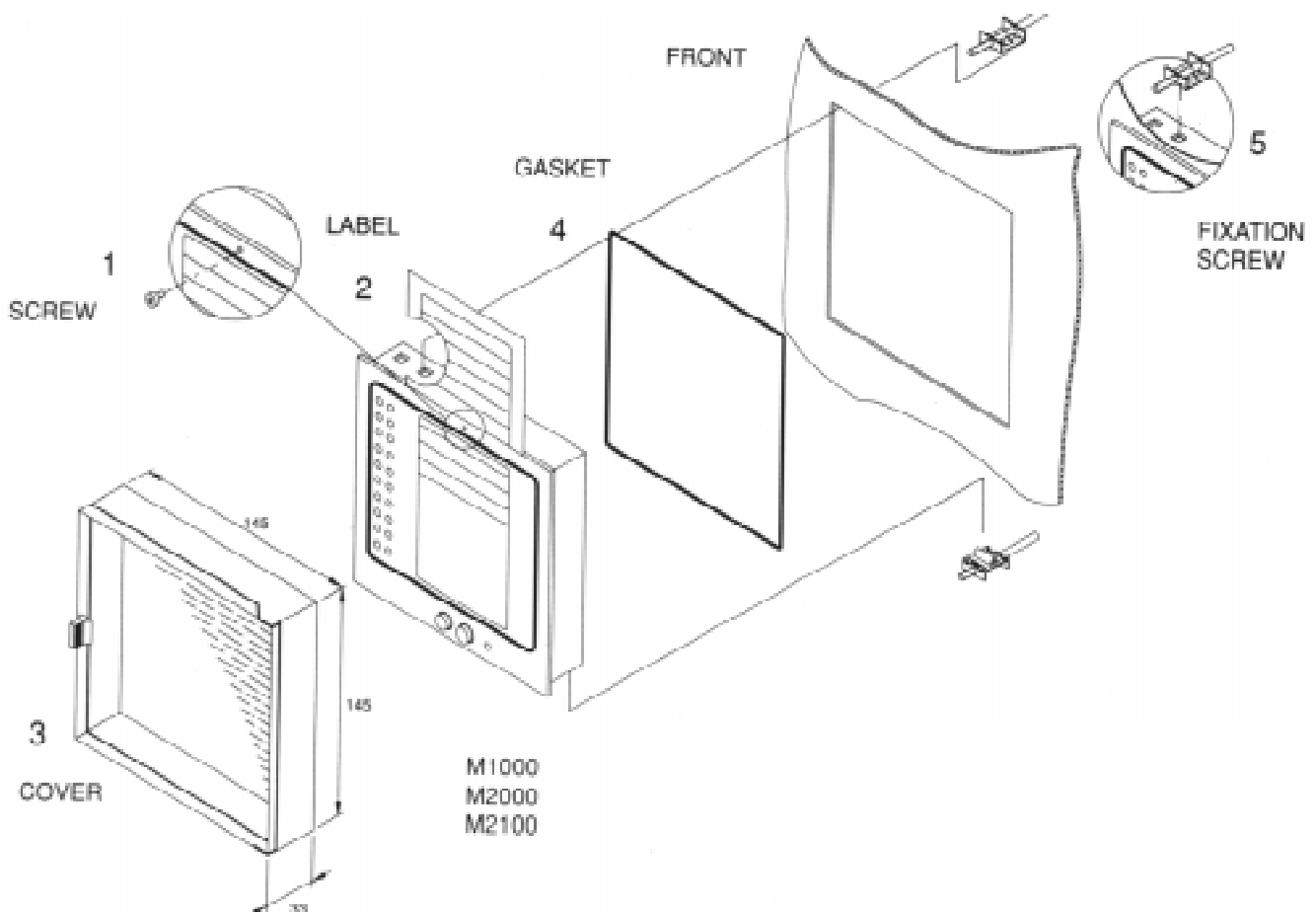
M0847-00-00 with handle

M0847-01-00 with key



Mounting of M1000 - M2000 - M2100

Assembly sequence 1 to 5



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