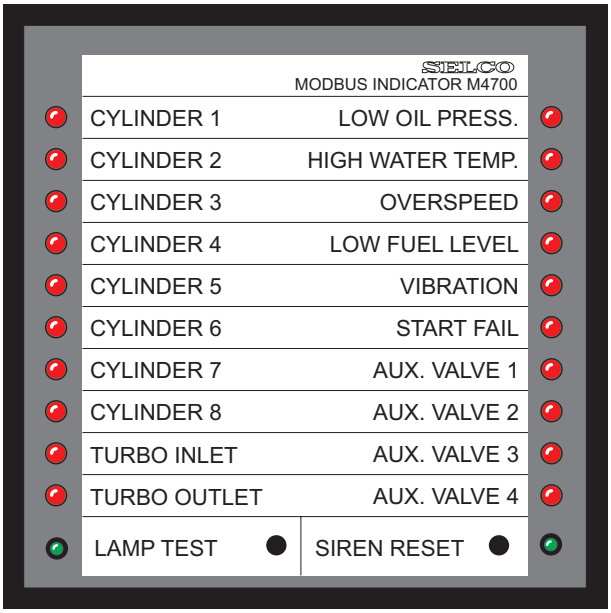
M4780 MODBUS Indicator

The SELCO M4700-80 is a versatile microprocessor based indicator panel to be used with direct potential free contacts, SELCO alarm annunciators and the SELCO H0300 Event Logger or in PLC systems.

- Simplifies indications in control panels and switchboards
- Complete unit for flush mounting in standard instrument size 144 x 144mm
- 20 programmable LEDs
- LED colour change through plug-in system
- The blank legend card can be typed or printed to suit. A Word template is provided
- Both direct inputs and RS485 bus communication
- RS485 interface for field-bus communication
- Standard MODBUS-RTU protocol
- Multiple units can be connected to the bus
- Cable length up to 1000 metres on the bus
- Equipped with alarm relay, siren relay and built-in siren
- Two integrated push buttons, one for lamp test and one for siren reset
- Quick installation by means of clamping fittings and plug-in terminal blocks for easy service



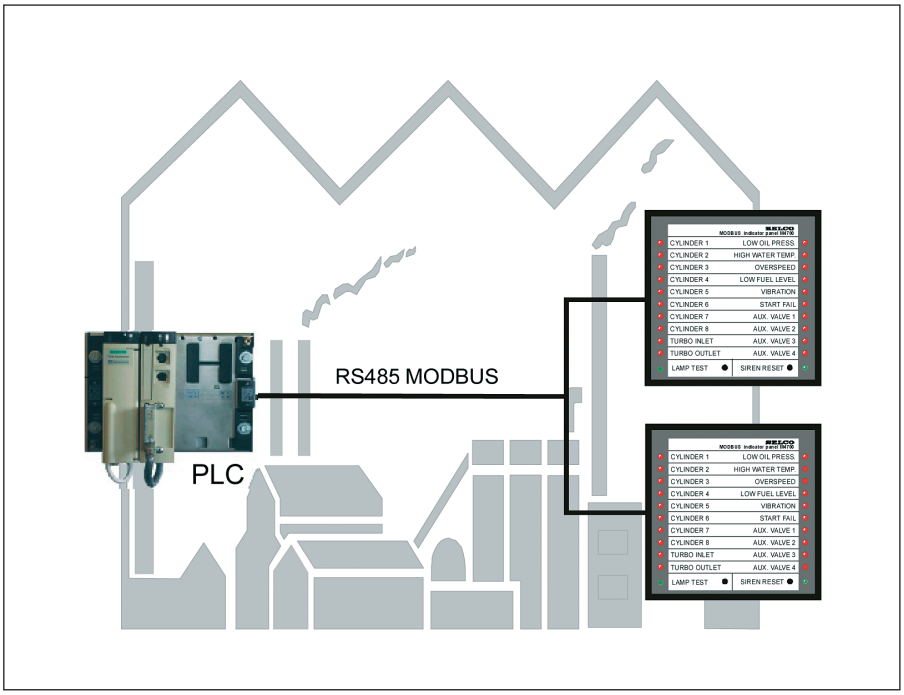


Fig. 1. Communication with a PLC.

Application

The M4700-80 MODBUS Indicator provides an ideal solution for clear indications at local or remote locations.

As the traditional SELCO indicator panels, the M4700-80 has direct connections to potential free contacts.

Additionally, it is equipped with a serial RS485 communication bus with only 2 wires. The indications of the unit can be controlled via this serial bus as well as from the direct connections. The controls via the bus can be made from any device capable of operating as a MODBUS master, e.g. a PLC, a PC or the SELCO H0300 Event Logger.

The indicator panel is also equipped with an alarm relay, a siren relay and a built-in siren.

M4700-80 supports the standard MODBUS protocol (RTU mode), for communication on the RS485 bus. Alarm inputs, control of the relays, siren and the indications of the LEDs can be controlled via simple MODBUS commands. For instance, the unit has commands for quick flash, slow flash, short flash pulses, steady light or no light on the LEDs. When used in alarm systems, a quick flashing LED will typically indicate first new alarm. Slow flashing LEDs will indicate the following new alarms. Short flash pulses will indicate cable error. Steady light will indicate acknowledged alarms, and no light will indicate normal state.

Via the bus it is also possible to reset the siren, the siren relay and all LEDs. An LED test can be performed and the LEDs can be dimmed from 0 to 100 %. This feature is particularly useful in ship applications where the panels are placed on the bridge.

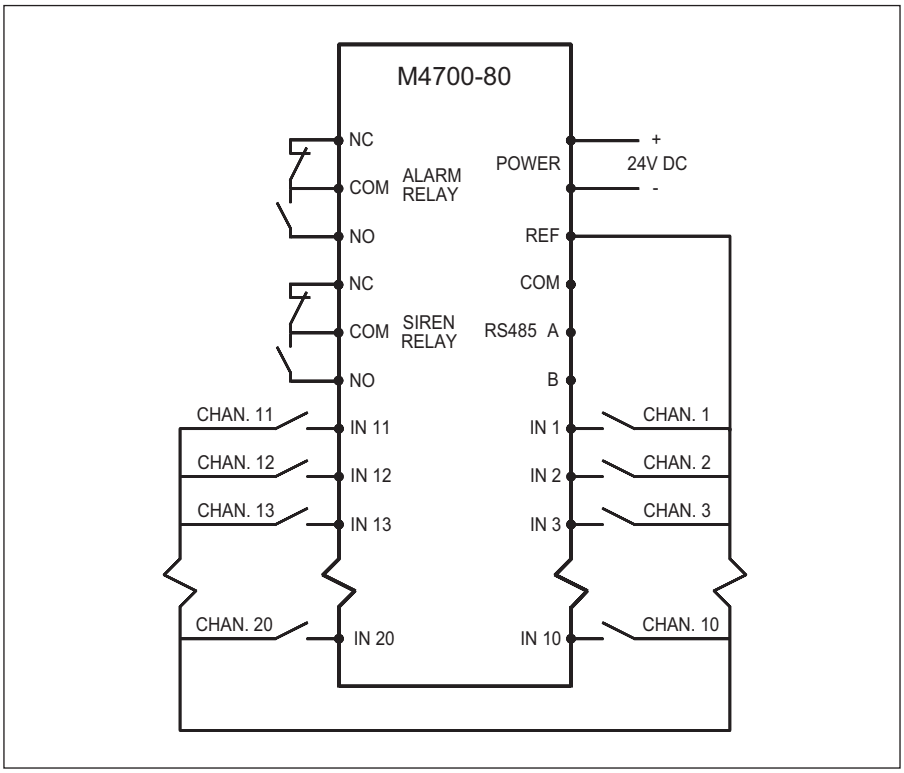


Fig. 2. Connection Diagram.

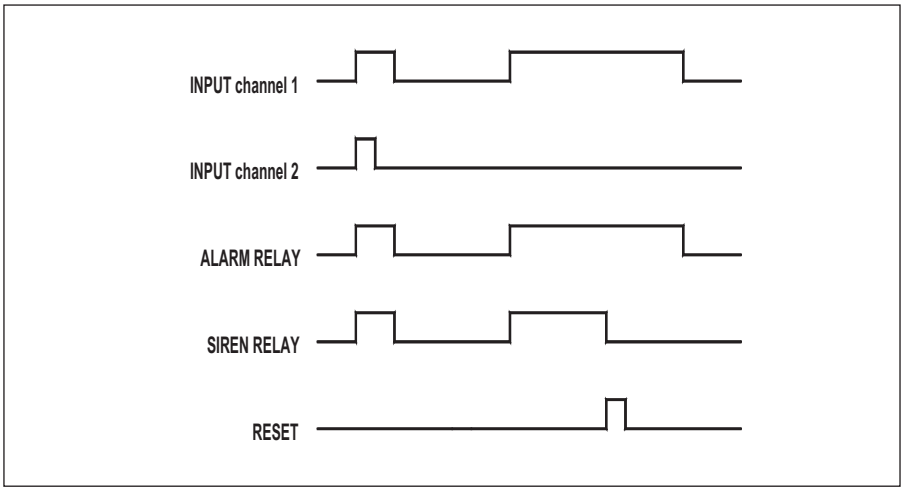


Fig. 3. Function Diagram.

Function

M4700-80 has 20 programmable LEDs on the front and two additional ones: "PWR" to indicate that power is on and "RUN" to indicate communication with the unit.

A text description for the LEDs can be printed on the blank legend card, situated between the two covers at the front. The card can be taped onto a sheet of paper, to enable printing. SELCO provides a Word template for doing this in an easy manner.

A direct connection from REF to the terminal with similar number as the indicator channel will illuminate the equivalent LED. REF can be selected as 0V DC or +24V DC via a jumper (JP1) behind the front plate (factory setting of this jumper is left position which will give 0V DC and right position will give +24V DC). The alarm and siren relays are also activated, and the built-in siren will give an audible alarm.

Pressing the SIREN RESET button will release the siren relay and cancel siren. The relay and the siren are activated, whenever a new alarm occurs (provided SIREN RESET has been activated).
The alarm relay is activated by the first incoming alarm and remains energized whilst an alarm is operational.

Behind the front plate is a jumper (JP2), adjacent to the siren, which will disable the siren, when removed.

Via the 2-wire RS485 it is also possible to set a "virtual input". A "virtual input" has exactly the same function as the physical inputs and the "virtual inputs" should be understood as being in parallel with the physical inputs. This means that if a physical input or a "virtual input" is set, the M4700-80 will react according to the function diagram shown in figure 3.

The LAMP TEST push button provides illumination of all LEDs. From the front panel it is also possible to adjust the brightness of the front panel LEDs by simultaneous activation of both the LAMP TEST and SIREN RESET push buttons. Dimming can be done in 5 consecutive levels.
Connections for the power supply (24V DC), the inputs and the RS485 interface are done on the rear panel. The cable length on the bus can be up to 1000 metres.

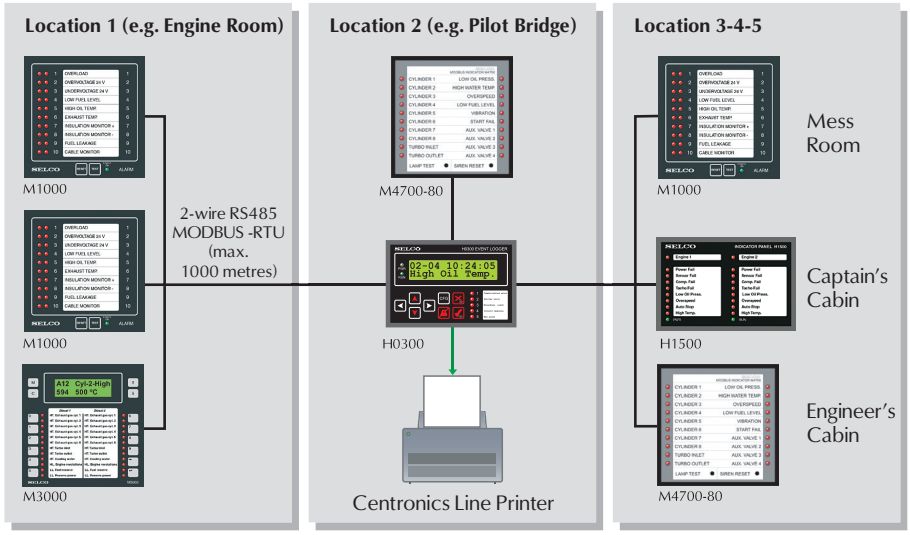


Fig. 4. Event Logging.

On the rear panel are also two rotary dials for selecting the baud rate used for communication on the RS485 bus. The available baud rates are 1200, 2400, 4800, 9600, 19200 or 38400. Furthermore, these dials are used for setting the unit's device address, to be used when communicating on the bus.

Baud Rate

The default Baud Rate is 9600 baud. However, this can be changed as follows on the two rotary dials SW1 and SW2:

- Set SW1 to "F" in order to bring the panel into configuration mode. This is now indicated on the front panel by the flashing "RUN" LED.
- Find the setting of SW2 according to required baud rate in the table figure 5.

SW1	SW2	Baud rate	Indication
F	1	1200 baud	LED 1
F	2	2400 baud	LED 2
F	3	4800 baud	LED 3
F	4	9600 baud	LED 4
F	5	19200 baud	LED 5
F	6	38400 baud	LED 6

Fig. 5. Setting of baud rate.

- Set SW2 to the right setting and observe on the front of the panel that the setting is indicated on the LED according to the above table.
- Set back SW1 at a different setting than "F" and observe that the "RUN" LED stops flashing, indicating that the unit is now configured.

Device Address

The device address can also be set on SW1 and SW2. The device address is set as a hexadecimal value.

Note: When the device address is set, the setting of SW1 on "F" should be avoided, as this would again bring the panel into configuration mode for changing the baud rate.

Device address 0 should also be avoided, as this address is used for broadcast messages, i. e. messages to be sent to all panels on the bus at the same time.

Example:
The device address should be set to 30 (1E hexadecimal). Set SW1 on "1" and SW2 on "E".

Event Logger H0300

The SELCO H0300 Event Logger logs alarms and events from multiple SELCO alarm annunciators and indicator panels, connected to a common 2-wire RS485 bus. The H0300 can survey and log events with related date and time from up to 63 units.

The H0300 can also be configured to act as an event repeater. The application shown in fig. 4 describes such a system. Alarms from the Engine Room are repeated on the Bridge, in the Mess Room, in the Captain's Cabin and the Engineer's Cabin. For more information see the H0300 Data Sheet.

MODBUS Protocol

The MODBUS protocol is a common and widely used protocol for communication on various types of networks.

The following MODBUS functions are available on the M4700-80 (hex):

Read bit	: 01 & 02
Read words	: 03 & 04
Write bit	: 05
Write word	: 06
Quick-read 8 bits	: 07
Write words	: 10

The read functions can be used from the PLC, for instance, to read the state of the siren or the state of one or more LEDs. The write functions could be used to set the state of the siren or one or more LEDs, or it could be used to set a "virtual input" as described earlier.

After specifying the function, the data bytes should be specified. The first data bytes specify, for instance, the LEDs in question to read or to set or perhaps whether to perform an LED test.

Some of these data bytes specify the following (hex):

0001	State of LED 1
0002	State of LED 2
0009	State of LED 9
000A	State of LED 10
0013	State of LED 19
0014	State of LED 20

Additional data bytes specify e.g. the LED states (hex):

0000	Off
0001	Steady light
0002	Short flash pulses
0003	Quick flash
0004	Slow flash

If an error occurs, the M4700-80 will respond with the following error codes (hex):

01	Unknown function
02	Illegal data address

A detailed description of the MODBUS protocol can be downloaded from the SELCO web site at www.selco.com.

SELCO

Specifications

M4700-80 MODBUS Indicator

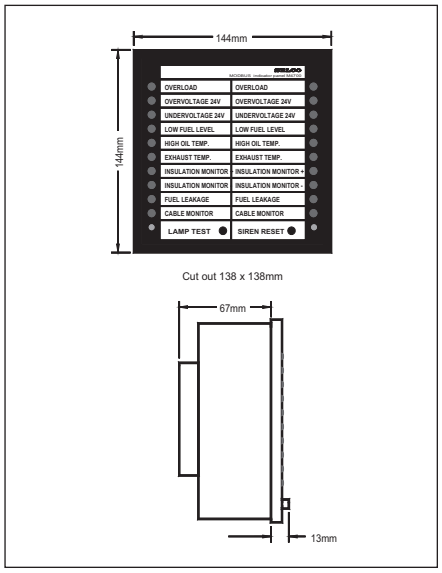


Fig. 6. Dimensions.

Voltage supply	24V DC ±25%
Consumption	Max. 3W (100mA at 24V DC)
Inputs	20 physical inputs and 20 "virtual inputs"
LEDs	20 programmable and 2 for system information
LED flash frequency	Slow flashing light: 1.25Hz ±10% Quick flashing light: 5 Hz ±10%
Alarm relay	Normally open (NO) contact
Siren relay	Normally open (NO) contact
Contact data	AC = 250V, 1.2A, 125VA. DC = 30V, 1A, 30W
Communication	RS485 interface
Protocol	MODBUS-RTU
Baud rate	1200, 2400, 4800, 9600, 19200, 38400
Parity	None
Data bits	8
Stop bits	1
Operating temperature	-10°C to +70°C
EMC	CE according to EN50081-1, EN50082-1, EN50081-2, EN50082-2
Burn-in	50 hours before final test
Weight	0.8kg
Dimensions	144 x 144 x 67mm (H x W x D)
Panel cut out	138 x 138mm
Protection degree at front	IP31

The specifications are subject to change without notice.

SELCO Worldwide

Accessories

M0847.0010	Front cover for M4700 with handle	IP54
M0847.0020	Front cover for M4700 with key	IP54

Main office:
SELCO ApS
Betonvej 10
DK-4000 Roskilde
Denmark
Phone: + 45 7026 1122
Fax: + 45 7026 2522
e-mail: selco@selco.com
www.selco.com

M4795-80-62E