Data Sheet

Message displays and accessories

Supplied to **RS** by ITT Instruments

The range of products includes:

- **Message displays** with a PC based configuration package. These are panel mountable displays, often used with a programmable logic controller (PLC), to provide the operator with messages and data in English and in appropriate units
- **Input scanning interface** allows up to 255 switched inputs to be fed into a message display without using a PLC
- **Operator keyboard** is a panel mounted input device, replacing push buttons and keypad in an attractive, space-saving unit, similar in style to the message displays
- **Message display and operator keyboard** for use with Siemens' PLC
- **Panel gaskets**.

Message displays

Input scanning interface (left) and operator keyboard

Overview

Product	**RS** stock no.	ITT Instruments no.	Description and features
Message displays General purpose	629-342 730-717 730-723 629-358 629-364	DAA 144-120B DAA 288-240B DAA 288-240B DAA 288-240B DAA configuration package	1 line, 20 character, 144 × 736mm bezel 24Vdc supply 2 line, 40 character, 288 × 72mm bezel, 24Vdc supply 2 line, 40 character, 288 × 72mm bezel, 110Vac supply 2 line, 40 character, 288 × 72mm bezel, 220/240Vac supply PC based package to configure messages in displays
Input scanning interface	693-286	ISI64	24Vdc supply, 64 switched inputs, parallel/serial output to direct to message display
Operator keyboard	693-258	DBT 288-1	All in one push button and numeric keyboard input, panel mountable, to connect into the PLC
Message display for Siemens' PLC	730-739 730-767 730-795 730-751	DAA 288-240S PC-DAA(S) Cable PLC-DAAS PG-MUX	2 line, 40 character, 288 × 72mm bezel, 240Vac supply PC based package to configure above display Cable to join above display to Siemens' PLC Intelligent port multiplexer
Operator keyboard for Siemens' PLC	730-745	DBT 288-1S	Operator keyboard for use with Siemens' dedicated message display and Siemens' PLC
Gaskets	730-773 730-789	Gasket 144 × 36 Gasket 288 × 72	Gasket to seal around small display in a panel Gasket to seal around large display or operator keyboard in a panel

Section index

1. General description

1.1 Message displays

Intelligent message displays are designed to enhance the efficient operation of a machine or process control system. They are used generally under the control of a PLC, to communicate status, fault, alarm or instruction message to the operator. Their compact panel mounting formats and built-in facilities offer more precise, modern and cost-effective alternatives to traditional warning lamps or annunciator panels.

System messages are pre-stored in a text memory, and can then be called up by the host PLC using a simple text address number. Each message display includes a parallel and serial interface, either of which can be used by a PLC to control the message display. Application examples are given later for use with RS Mitsubishi and RS Siemens PLCs, but these message displays are compatible with virtually any PLC or controller.

A wide choice of facilities and operating modes allows these message displays to meet most operational system requirements. For example, pre-stored messages can be combined with variable data to display actual process values, such as:

'Production rate per hour –
Target: 1234, Actual: 2143'

The particular facilities and operating modes required for a specific system are selected at the commissioning stage via the front push-button keys, using an easy-to-use, built-in setup menu system.

Message texts can be pre-stored into the text memory by RS-232C* terminal or configuration package. In particular, the configuration package provides simple menu-driven software, which operates on IBM® or compatible PCs, together with an interconnection cable.

For an analysis of system faults or machine down time, these message displays can be simply linked to an ITT Instruments panel mounting data printer (RS stock no. 622-997). This arrangement can provide a hard copy record of designated messages, together with the date and time that they were triggered, from the real-time clock in the message displays.

Features

- Bright vacuum fluorescent display with either 1 line 20 characters or 2 line 40 characters
- Up to 255 text displays which can be 'stacked' as they are triggered to show the first or the last received
- Scrolling texts with up to 175 characters
- Insertion of variable data eg. temperature
- Real time clock
- Panel mounted, IP65 facia
- Relay alarm output
- Information may be recorded by using the compatible panel mounted printer RS stock no. 622-997 (see Panel meters section of the RS Catalogue).

Supplied with full operating instructions

Product	Power supply	**RS** stock no.
1 line	24Vdc	629-342
2 line	24Vdc	730-717
2 line	110Vac	730-723
2 line	240Vac	629-358
Package	–	629-364

1.2 Input scanning interface

W: 295 H: 95 D: 65

This product has been designed to connect the plant or production process directly to a message display without having to use a PLC. It operates by taking up to 64 switching inputs and outputting the signals in a form the message display can understand easily, either RS-232 or 8 strobed parallel binary lines. Up to 4 devices can be linked together in a master/slave arrangement giving a system of up to 255 inputs.

Because of the way the product is configured:

- It may still be used with a PLC to reduce the work load of the PLC. Signals are used to generate messages in the display before being input to the PLC;
- It can be used to cut cabling costs using the strobed parallel binary output; 64 switched lines can be reduced to 8. Transmission distance is up to 100m.

Features

- Power input 240Vac or 24Vdc
- 64 24Vdc switched inputs. 'Input terminals' are detachable for ease of fault finding and installation
- 24Vdc, 15mA supply generated for inputs
- DIP switch selectable 1200, 2400, 4800 or 9600 baud for RS-232
- Each device is configured using DIP switches for master or slave 1 to 3 to provide a system of 64, 128, 192 or 255 switch inputs. Slaves can be positioned up to 10m away from the master, connected by two core and earth cable
- Display mode on the display is set by DIP switch or by an input signal via a pair of dedicated terminals
- Messages can be linked together using the 'Come, Go' DIP switch; the first message is called on the rising edge of the signal, the second on the falling edge
- Update time on whole system is 10 to 50ms for one unit
- Supplied with standard DIN rail.

Supplied with full operating instructions

Product	**RS** stock no.
Input scanning interface	693-286

1.3 Operator keyboard

This attractive panel mountable operator keyboard is a multi-function device for entering commands and data into a PLC . Its functions keys can replace up to 16 individual push buttons, whilst only requiring a minimum of 4 inputs to the PLC, reducing the size of PLC required. LEDs next to each function key can be used to provide feedback from the PLC to show that the input signal is input and actioned correctly, ensuring greater system reliability. The numeric keypad is used to input values; cursor keys are also available.

Communication between the operator keyboard and the PLC is either by parallel binary or serial RS-232 where the PLC has a configurable RS-232 port.

The keyboard is ideally used with a message display, reducing the overall numbers of inputs and outputs, and reducing or eliminating the need for extra push buttons and annunciators.

Features

- 230Vac or 24Vdc power supply
- 8 function keys can be assigned dual functions by preceding function key by shift ↑
- Status LEDs can be used as feedback from the PLC to show input signal has been correctly received. LEDs can be made to flash
- Self test or power on
- Outputs to the PLC can be unbuffered or buffered. When unbuffered, the output is ON as long as the key is depressed. In buffered mode, the PLC requests information via a strobe signal from the PLC. Up to 15 actuated keys are held in the buffer and one output First-In, First-Out
- Short bleep gives an audible acknowledgement of a correctly depressed key; a longer bleep indicates an error
- Numeric keypad can be configured to output either in binary or a 3 digit decimal value plus sign, ie. 0 to +255 or –128 to +127
- Inputs can be locked by a signal from the PLC. Different combinations available are:
  - all unlocked
  - numeric keypad locked, function keys unlocked
  - numeric keypad locked, half function keys unlocked
  - all keys locked.

A separate emergency stop button is still required.

Connection to the PLC

Parallel

From PLC: 2 lock lines, 5 LED status lines, 1 strobe in line.

To PLC: 4 function key lines, the control signals configured in hexadecimal, 8 numerical keypad lines configured in ASCII or binary by a DIP switch on the rear of the unit.

Serial

RS-232 serial port, 9 pin D connector to a configurable RS-232 port on the PLC. PLCs in the **RS** range with configurable RS-232 ports, are Mitsubishi A1S PLC, Omron Mini-M PLC and Siemens S5-100U PLC. (See elsewhere in this data sheet.)

Supplied with full operating instructions

Product	**RS** stock no.
Operator keyboard	693-258

1.4 Message display for use with Siemens' PLC

This panel mountable intelligent message display is designed for technical control applications to provide the operator with easy to understand information, highlighting faults and providing extra instructions automatically. Used with either the Siemens' S5-90U, 95U or 100U PLC supplied by **RS** or the Siemens' S5-115U or 135U PLC (not supplied by **RS**), it plugs into the programming port of the PLC. The display then acts as an extension to the PLC program and does not require external PLC I/O to be used, important on compact PLC systems. A separate cable to connect the PLC to the display is required. The display is programmed by a PC based programming software, Siemens' PLC dedicated.

'Master' operating control

The display can be programmed to be an active device, taking the initiative to interrogate the PLC so leaving the PLC free to perform its control functions.

Functions:

- Search in the PLC data block for messages to be displayed
- Read binary data for analogue values and flags
- Converts these values to text or numbers
- Displays the text complete with variables.

PLC programming requirements

A dedicated data block is required. The display scans the flags and data in this block which the program and the PLC process have generated and then displays the appropriate message.

Message queuing can be handled in a number of chosen ways; single message, first message displayed, last message displayed.

Other features

- Bright vacuum fluorescent display with 2 line 40 characters
- Up to 253 text displays
- Scrolling text with up to 175 characters
- Real time clock
- Panel mountable, IP65 facia. Extra panel sealing gasket is available
- Relay alarm output
- Information may be recorded by using the compatible panel mounted printer **RS** stock no. 622-997.

Supplied with full operating instructions

Product	**RS** stock no.
Message display-Siemens	730-745
PLC display cable	730-795
Programming PC software	730-767

1.5 Operator keyboard for use with Siemens' PLC

This attractive panel mounted operator keyboard is a multifunction device for entering commands and data into a Siemens' PLC. Its function keys can replace up to 16 individual pushbuttons. Key functions can be labelled on the removable strip. LEDs next to each function key can be used to provide feedback from the PLC to show that the input signal is input and actioned correctly, ensuring greater system reliability. The numeric keypad is used to input values. Cursor keys are also available. Communication between the operator keyboard and the PLC is via the Siemens' PLC dedicated message display.

The keyboard reduces the overall number of inputs and outputs required on the PLC, and reduces or eliminates the need for extra pushbuttons and annunciators.

Features

- Facia is IP56 sealed and matches the message display (**RS** stock no. 730-739)
- Power is taken from the display
- 8 function keys can be assigned dual functions by preceding function key by shift key
- Status LEDs can be used as feedback from the PLC to show that the input signal has been correctly received. LEDs can be made to flash
- Self test on power on
- Short bleep gives an audible acknowledgement of a correctly depressed key, a longer bleep indicates an error
- Inputs can be locked by a signal from the PLC. Different combinations available are:
  - all unlocked
  - numeric keypad locked, function keys unlocked
  - numeric keypad locked, half function keys unlocked
  - all keys locked
- A separate rubber sealing gasket for the panel cutout is available.

A separate emergency stop button is still required.

The keyboard is supplied with manual and connecting cable to the display.

Product	**RS** stock no.
Operator keyboard-Siemens	730-745

1.6 Intelligent port multiplexer

W. 240 H. 60 D. 150

This unit is designed to ease the interfacing of Siemens Simatic S5 PLCs with the Siemens dedicated message display, **RS** stock no. 730-739 together with the Siemens dedicated Operator Keyboard, **RS** stock no. 730-745.

Main functions:

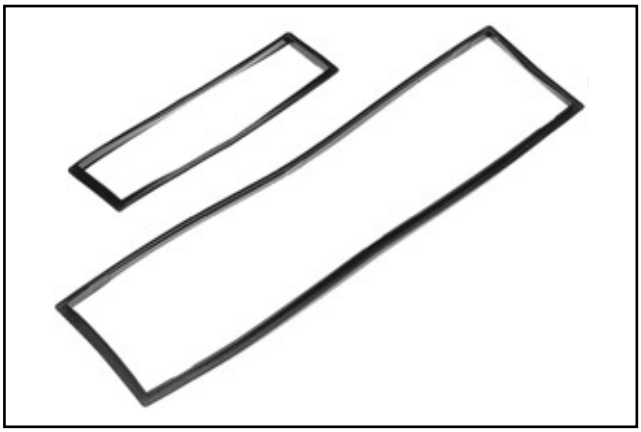
- During system commissioning and debugging, a display keyboard and a PLC programmer, eg. PG710, **RS** stock no. 629-572 can be connected through the multiplexer to the PLC programming port
- Two independent display/keyboards combinations can be operated from the single PLC. This allows the PLC to monitor and control two separate operator stations or two separate machines.

Main features

- 20mA current loop transmission with PLC 'active' and PG-MUX 'passive'
- Connection to all Siemens Simatic S5 PLCs via 3m long cable (supplied) with integral connector
- 240Vac, +10%, –5% power supply, cable supplied
- Delivers power so hand held Siemens Simatic S5 programmers can be used
- Two interfaces are active due to 20mA current sources. The connected devices are passive
- A LED provides feedback on correct operation.

Product	**RS** stock no.
Intelligent port multiplexer	730-751

1.7 Panel sealing gaskets



- Rubber seal provides protection against ingress of dust and water to the panel
- Designed to fit small message display and large message display and operator keyboards
- Bezel sizes 144 × 36mm and 288 × 72mm.

Product	**RS** stock no.
Small	730-773
Large	730-789

2. Message displays

2.1 Programming the text memory

Both message displays include a CMOS-RAM text memory. This is battery-supported and can store up to 16,000 characters, including control codes. These models have a maximum of 255 text addresses, depending on the input mode.

A choice of character sets allows the text memory to be programmed to display messages in either English (ASCII), German, French, Scandinavian or Russian (Cyrillic).

This memory can be programmed in several ways. In particular, the DAA configuration package (RS stock no. 629-364) provides a simple menu-driven software package (MWTA) which operates on IBM® or compatible PCs. This creates a text file which is sent via the serial port on the PC to the serial interface of the display.

2.1.1 Programming steps with the configuration package

1. Install the software on your XT/AT IBM® or compatible personal computer, following the installation instructions supplied with the package. Disks are formatted double sided, double density. Both 3½ and 5¼ inch disks are provided. This software includes an on-disk operating manual which can be viewed on the screen, or printed out.

2. Load the program and select the display type you are using: 1 line or 2 line. (The software is also suitable for other ITT displays and printers not supplied from RS.) Create a new file name and move to 'Edit texts' to create a new text file (or edit an existing one).

3. Text can be entered for each 'Text No.' in a 1 × 20 or 2 × 40 character window, depending on the display model chosen. Text can be set to appear as a static message, or as a moving message up to 175 characters long. For the two line model there are five options: static text in the top, bottom or both lines; or moving text in the top or bottom line.

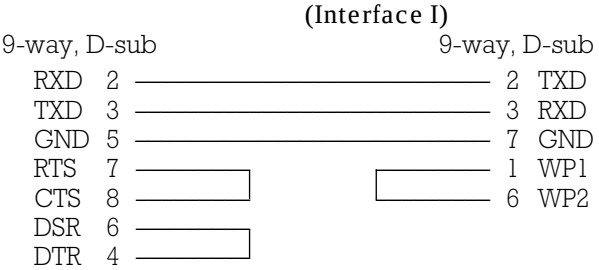
Control (Ctrl) codes are used to set up to two blocks of characters within a message text to blink (flash), and to mark up to three fields where variable data (actual values) can subsequently be read into a message. In addition, two flags are set for each text number to operate the collective alarm relay and/or down-load the message to a hard copy printer connected to the serial interface when the text is called.

4. You should then 'Save' your text file on disk.

5. The next stage is to 'Transfer' your text file to the message display text memory. First connect the serial port of your PC to the serial interface on the message display using the 9-way/9-way cable supplied with the configuration package. (If your PC has a 25-way serial port, use a 25-way/9-way converter, eg. RS stock no. 255-193.)

These intelligent message displays have a single serial interface which can be accessed either under a cover at the front (Interface I) or at the rear (Interface II). The cable supplied has a 9-way connector to suit the single-line display Interface II or the two-line display Interface I. See Figure 1 for connections.

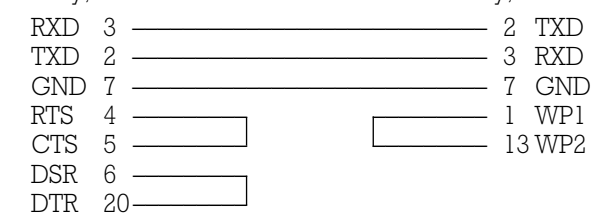
Figure 1 Connections for programming



This is the plan for the cable supplied with the DAA configuration package.

NB: The text memory is 'locked' unless WP1 and WP2 are linked (and Interface I cover is removed on the DAA 144-120B).

Alternative connections:



Other 'cable plans' are given in the 'transfer' menu of the programming software.

The message display should be configured via its front keys (using the setup menu, see Appendix A) to use interface I (RS stock no. 629-358) or Interface II (RS stock no. 629-342) at the same Baud rate, etc. as the PC. The software default settings are for COM 1, 2400 Baud, 8 bit, 1 stop bit, no parity.

The message display should be set for 'Text input – File' mode. The 'file' can then be transferred to the message display text memory. A Text number count is shown on the PC screen and message display to show progress during the transfer.

6. The display should now be ready for final configuration and installation into the operating system.

2.1.2 Alternative Programming Methods

The software combines a dedicated text editor with communications and utility programs and is designed for maximum convenience with the ITT message displays. However, suitable text files can be created by other text editors including the DOS EDLIN utility. In addition, the message displays include an 'Edit Mode', which allows a terminal, RS-232 keyboard, etc.

to write directly to the text memory. Fuller details are given in the operating instruction manual. If required, the text memory RAM can be replaced by a suitable EPROM for permanently stored text. Text files created by the software can be output in various EPROM programmer formats.

2.2 Operation

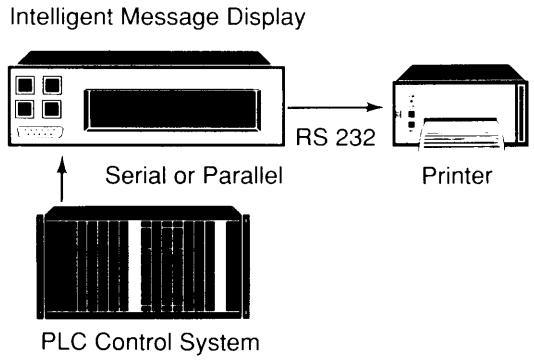
These intelligent message displays are very flexible and include several functions which can be selected to suit particular installation and operating requirements. These functions are selected via the front keys using the built-in setup menu (see Appendix A for full details). The prime choices are:

- Input mode – how texts are triggered;
- Variable mode – variable data input method;
- Operating mode – four internal/external options.

2.2.1 Input mode

This mode selects how a text is triggered, normally by a PLC connected to the parallel or serial interface. The PLC, or controller, requires suitable steps in its operating program to trigger the required text address number(s).

Figure 2 **Typical configuration**



See Section 3 for examples with **RS** Mitsubishi and **RS** Siemens PLCs.

2.2.1.1 Text call via the parallel interface

This interface comprises eight data lines D0...D7, Strobe T, and Ground – see Section 5 for details. Via the setup menu, these eight data lines can be decoded as Binary, BCD or Single. Inputs are 24Vdc active high.

Binary: Means eight data lines D0 $=2^0$ (= 1).....D^7=2^7 (= 128). This allows up to 255 text addresses.

eg. Text No. 29 is: 10111000 (D0.....D7).

BCD (binary coded decimal): Means four data lines D0=2^0 (=1)..D3= 2^3 (=8) representing 'units' 0 to 9; and four lines D4=2^0 (=1)..D7=2^3 (=8) representing 'tens' 10 to 90. This allows up to 99 text addresses.

eg. Text No.73 is: 11001110 (D0.....D7).

Strobe T: Binary or BCD coded data inputs can be used with or without a strobe. The strobe function is set 'active' or 'passive' in the setup menu. Active strobe is generally recommended and is always needed when variable data overlay is used.

Figure 3 **Timing diagram without Strobe (Passive)**

Data lines must be stable within 3ms

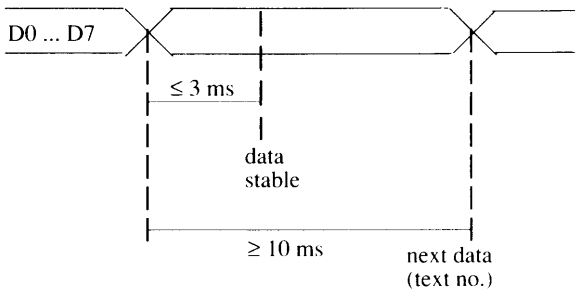
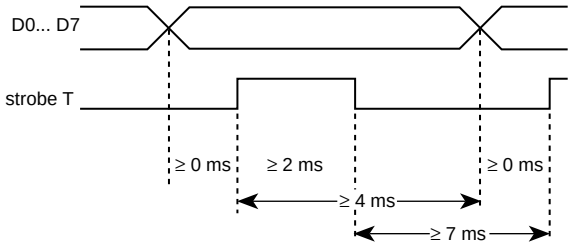


Figure 4 **Timing diagram with Strobe T (Active)**



Single: This mode allows the eight inputs D0.....D7 to trigger the first eight messages (No. 1.....No. 8) directly. The strobe is not used. Again, the inputs are 24Vdc active high.

2.2.1.2 Text call via the serial interface

A PLC, or controller, should be connected to the rear serial Interface II (9- or 25-way D-sub connector, depending on the model).

When serial text is selected under the 'Input Mode' in the setup menu.

Caution: The interface and parameters should be set in the 'Interface' section of the menu to match the configuration of the PLC.

The protocol to call a text is: Text No. (1 to 3 characters) followed by <CR>, where <CR> means 'Carriage Return' (Ctrl M or OD in Hex).

eg. To call Text No. 17: send 17<CR>, or 017<CR>.

2.2.1.3 20mA current loop option for **RS** stock no. 629-358 Interface II

This model offers standard RS-232 or 20mA active current loop serial communications options on the rear Interface II. Current loop operation allows the PLC to communicate with the message display over a greater distance.

2.2.1.4 Addressable serial format

These message displays can be designated via the setup menu with a device address 00 to 31. This allows one controller to send specific messages to one of a number of displays connected to the same serial port. A unit with address 00 will respond to all text calls. The protocol is:

ENQ, Address (2 digits), Text No. (1 to 3 digits), <CR>, EOT

eg. For address 03 and Text No. 147 this becomes: Ctrl1E03147<CR>CtrlD.

2.2.2 Variable mode – variable data overlay

In many applications it is desirable to be able to combine a pre-stored 'background' message overlaid with 'variable' data. This variable data might represent actual temperature, pressure, speed or other process variables, or even plant locations, bin numbers, etc.

2.2.2.1 General options

Background texts can be triggered and variable data input by any combination of the parallel and serial data interfaces. The interface(s) to be used for the text call (input mode) and variable data (variable mode) are independently selected in the setup menu.

The operation with variable data overlay is straightforward if the text call (eg. parallel) and variable (eg. serial) are different interfaces, provided the background text has been suitably programmed with variable data field(s).

The first character of variable data fills the first (left hand) position in the reserved variable field(s). Data which is required right justified should be sent with leading zeros or space characters.

When the variable is to be input via the same interface as that used to trigger the text call, then specific protocols apply.

2.2.2.2 Text call and variable overlay by the parallel interface

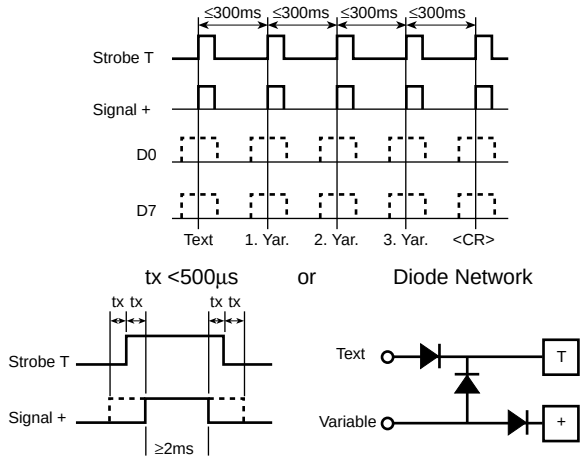
The text number in binary or BCD code (depending on the setup menu configuration) is input on the data lines D0.....D7, together with the Strobe T signal (2ms minimum). Each variable character is input via eight data lines D0.....D7 if binary code is set, or via four data lines D0..D3 if BCD code is set, together with two strobe signals to Strobe T and '+'. (See timing diagram Figure 5.)

The variable data is input character by character, terminated with a <CR> character. The first variable character must arrive within 300ms of the text number. Each subsequent character must also arrive within 300ms of the previous character.

Variable characters can be any ASCII character in binary mode, or in BCD the characters: 0-9,–,+,.,<,>.

Note: The single text call mode cannot be combined with variable data via the parallel interface.

Figure 5 **Timing diagram for variable overlay and text call via the parallel interface**



The suggested diode network allows the PLC to provide two independent strobe lines for Text and Variable, which either trigger Strobe T, or both Strobe T and '+' with the correct synchronisation.

2.2.2.3 Text call and variable data overlay via the serial interface

The text call (input mode) and variable overlay method (variable mode) should both be set for Serial in the setup menu configuration. The interface (normally II) and its parameters (baud rate, etc.) should also be configured to suit the PLC.

The protocol is then as follows:

Text No., CtrlV, 1st/2nd/../last/variable character, <CR>.

eg. For Text No. 147 with variable '123Abc' this becomes:

147CtrlV123Abc<CR>

In Operating Mode 0 (Section 2.3.1) the variable can be refreshed without recalling the same Text No.

eg. New variable '456Def' is sent, without Text No. prefix as: CtrlV456Def<CR>.

2.2.3 Operating modes

A choice of four operating modes is available to meet the requirements of different operating systems. The setup menu (see Appendix A) allows a specific mode 0, 1, 2 or 3 to be selected, or 'External' which allows the PLC to select or change the same four operating modes via two additional control lines (OM:2.0 and OM:2.1). Variable data can be combined with the pre-stored message texts in all operating modes.

Operating mode	Display operation	External OM:2.0	OM:2.1
OM:0	Display current text number	0	0
OM:1	Display first text number called	1	0
OM:2	Display last text number called	0	1
OM:3	Sequence through all texts called	1	1

2.2.3.1 'OM:0' display current text number

In this operating mode, the display shows the message stored under the Text No. currently being called, provided that it has been pre-programmed with a message. The next Text No. which is called will overwrite the first one, and so on.

The way this works in detail depends on the Input Mode. For Binary/BCD text call via the parallel interface with Strobe T passive, the message will be displayed while the inputs are active. When the inputs are all zero (equivalent to Text No. 0), the 'default display' – usually date and time – will be shown (Section 2.2.3.7). With Strobe T active, the operation is the same except that the Text No. will only be read when there is a Strobe T signal.

When the parallel interface is configured as 'single', the message for the highest Text No. being called is displayed. The strobe function is not used.

For serial text call, the last message is displayed until another valid Text No. is called. Again, Text No. 0 calls the default display.

The way in which a message is overwritten, on the two line display, depends on how it is programmed in the text memory. For example, a two line message will overwrite all of the previous message. However, a single line message in the top line will not be overwritten by a single line text in the bottom line. Both will be displayed together, which can be desirable for 'linked' messages (Section 2.2.3.2).

2.2.3.2 OM:0 linked messages

An important extra feature in OM:0 is the facility for the operator to obtain a linked message to provide further instructions by pressing the '–' key on the front panel. These linked messages, when required, are programmed under a higher Text No. Specifically, the Prime Text No. plus 128. Eg. prime fault message No. 12 might be programmed to say 'Power supply No. 2 failed'. A 'linked' Text no. 140 could be programmed to say 'Switch-off main system, replace power supply No. 2 – see machine manual page 73, restore power and start test sequence. Call service engineer if fault persists'. The moving text feature, which allows messages up to 175 characters long to be scrolled across the display, can be useful for such linked texts.

The appropriate linked text is displayed when the '–' key on the front of the unit is pressed. A second press on this key clears the linked text, a further press clears the original message.

2.2.3.3 'OM:1' display first text number called

In this mode, the messages are numbered(*) and stored in the order that they are called. This builds a display queue with up to the latest 127 text calls. The first message received is displayed. The whole message flashes if there are further messages in the queue. The operator can page through the messages using the '+' key and acknowledge (delete) individual messages with the '–' key.

The remaining messages are automatically re-numbered and further texts can be added to the queue even while the operator is paging through it. To reset to the first message, press the '+' key for more than three seconds. To delete all messages in the queue, press the '–' key for more than three seconds.

NB: The key functions can be partially/fully inhibited (Section 2.2.6).

(*) For static messages the number is shown at the end of the text. For moving messages it is at the beginning. This number is not shown on the single line display unless the last three characters have been left vacant during programming.

2.2.3.4 'OM:2' display last text number called

Similar to OM:1, except that the pre-stored message for the last valid Text No. called is displayed.

2.2.3.5 'OM:3' sequence through all texts called

Similar to OM:1 and 2, except that all texts called are displayed in sequence for a preset time. This 'display time' from 0.5 to 30 sec is set in the setup menu.

Moving messages are scrolled in full once even for short display times. The texts are not number in OM:3.

2.2.3.6 Remote acknowledgement by the PLC

The PLC or controller can remotely acknowledge (delete) an individual Text No. from the message queue in OM:1, 2 and 3 using the parallel interface. The PLC first calls the required Text No. and then simultaneously operates the Strobe T and '–' inputs.

2.2.3.7 Default displays

The default display for the single line model, is the date and time – equivalent to Text No. 0. The two line model, offers two alternatives: either just date and time – equivalent to Text No. 0 – or a pre-stored message of up to 40 characters in the top line only, together with date and time in the bottom line. This is stored as Text No. 255.

This facility allows a specific message (for example the name of the machine manufacturer or service company) to be displayed at switch-on, or when no other messages are required. If Text No. 255 is programmed in any other way, perhaps over both lines or with moving text, then it loses its default status but can still be used as a normal Text No.

2.2.4 Alarm function

Each Text No. has an 'alarm' flag, which can be individually set during programming stage, to operate the built-in alarm relay when the Text No. is called. The voltage-free relay contacts could trigger a siren to summon the operator. Any Text No., with the alarm function set, can operate the alarm on a 'collective' basis. The alarm is reset by pressing the '+' and '–' keys at the same time. Alarm reset can be combined with acknowledgement (ie. deletion of the message from the display) by pressing just the '–' key. These operations are also possible via the equivalent control inputs.

2.2.5 Print output

Each Text No. has a 'print' flag, which can be individually set during the programming stage. This allows designated messages, together with date and time, to be down-loaded to a data printer connected to the serial interface, provided the 'print format' is set to 'normal' in the setup menu. This function can be used to send designated messages to a remote slave display (such as an ITT Instruments DAA....A model not supplied by RS) instead of a printer. In this case the print function is set to 'slave' which retains the flashing and scrolling attributes. Any device connected to the serial interface must be set for a compatible Baud rate, etc.

2.2.6 Inhibiting the front key functions

The operation of the four front keys on these message displays can be partially or fully inhibited by connections to the control inputs. Set the 'Enter' input high to block access to the setup menu. The 'Mode', '+' and '–' keys can still operate.

Set both the 'Enter' and 'Mode' inputs high to block all key operation. The '+' and '–' functions can still be remotely operated, for example by the host PLC, via their respective control inputs. Set input high means 24Vdc.

2.2.7 Real-time clock

A real-time clock provides date and time for the default display and can be output with messages sent to a printer. This output can be suppressed, perhaps when a slave display is used rather than a printer, by setting the 't' (Time) control input high. The clock is adjusted via the setup menu, or the serial interface.

2.2.8 Testing the input lines

The status of the 16 control input lines can be viewed on the display for system diagnostics. This function is selected in the setup menu.

2.3 Typical applications

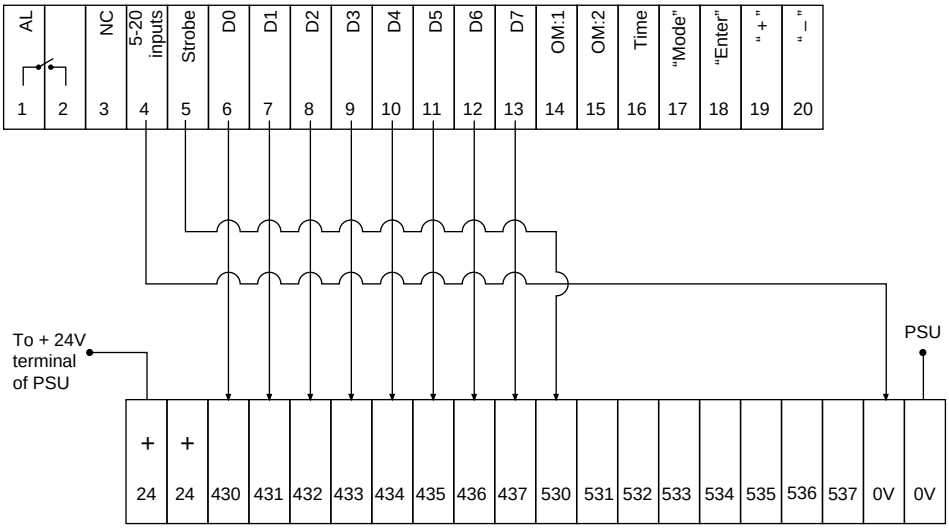
2.3.1 Application with **RS** Mitsubishi PLCs

Any suitable outputs from the PLC may be used. The ones listed are for example.

2.3.1.1 Using F1, F2 Mitsubishi PLCs.

Simple parallel

Display, **RS** stock no. 629-358

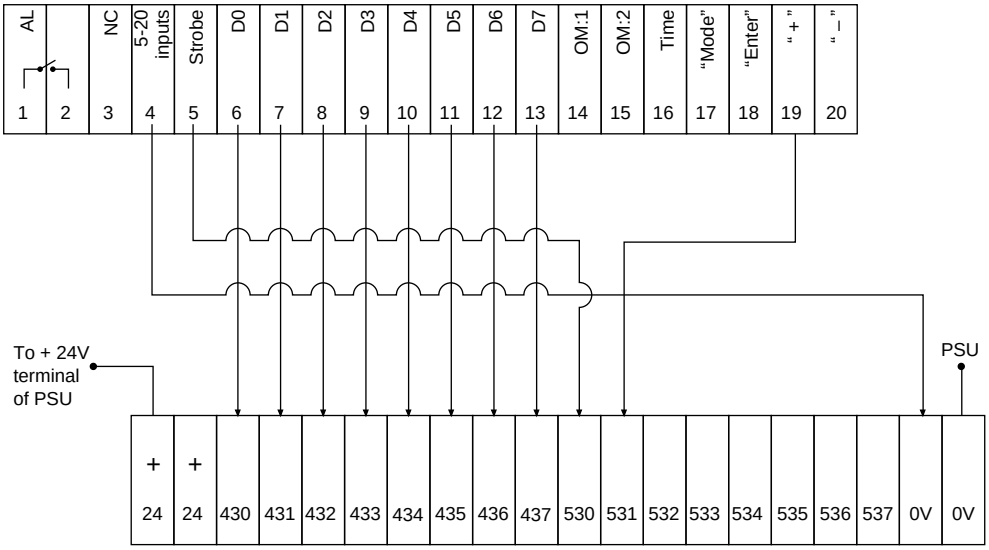


F1, F2 PLC

Note: The strobe line is optional.

Parallel with variable data

Display, **RS** stock no. 629-358



F1, F2 PLC

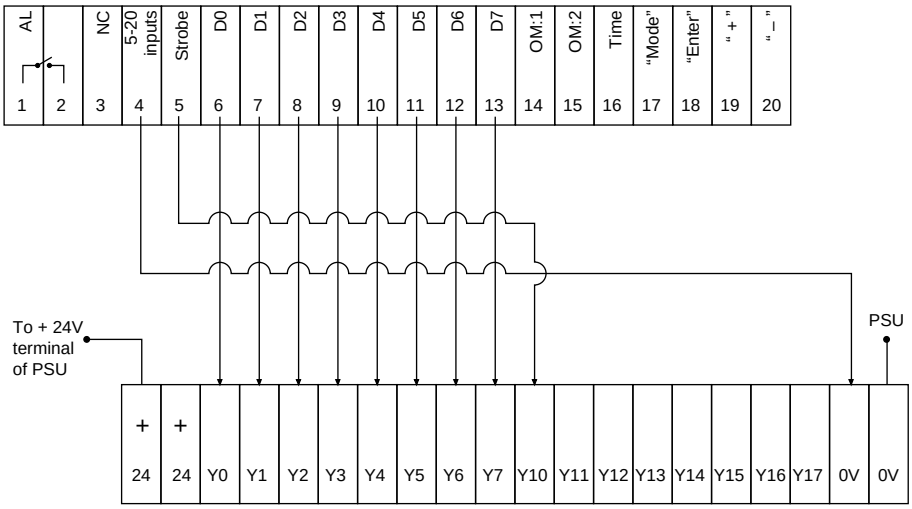
If relay outputs on the PLC are used, it is recommended that the diode network is used for the strobe and '+' inputs (Section 2.2.2.2).

Serial communication
F1, F2 cannot be used in this communication mode.

2.3.1.2 Using FX Mitsubishi PLC

Simple parallel

Display, **RS** stock no. 629-358

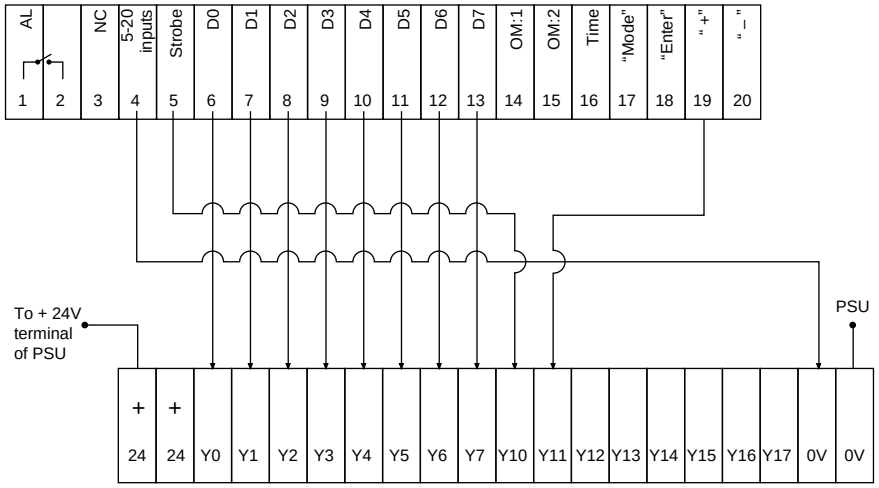


FX PLC

Note: The strobe line is optional.

Parallel with variable data

Display, **RS** stock no. 629-358



FX PLC

Where relay type PLCs are used (eg. F1 PLCS) it is recommended that the diode network is used for the strobe and '+' inputs (Section 2.2.2.2).

Serial communication

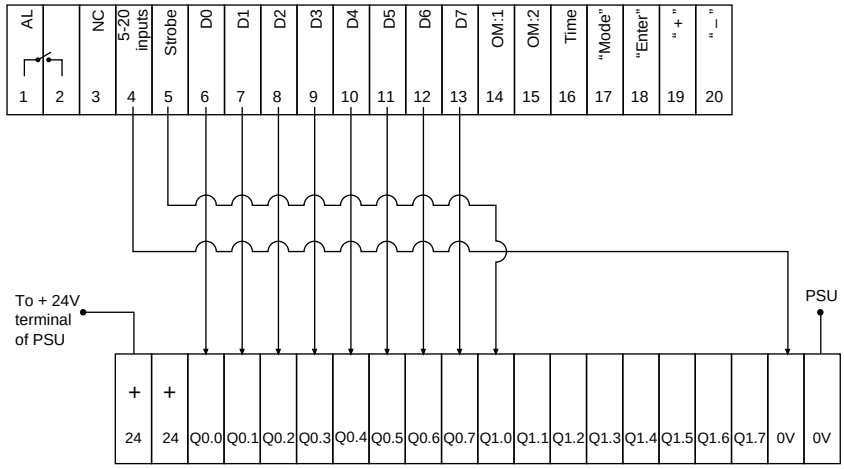
FX PLCs cannot be used with this communication port as the maximum baud rate of the displays is 2400 baud, the **RS** stock no. 628-642 FX Communications block is set at 9600 baud.

2.3.2 Application with **RS** Siemens S5-100U PLC

Any suitable outputs from the PLC may be used. The ones listed are for example.

Simple parallel

Display, **RS** stock no. 629-358

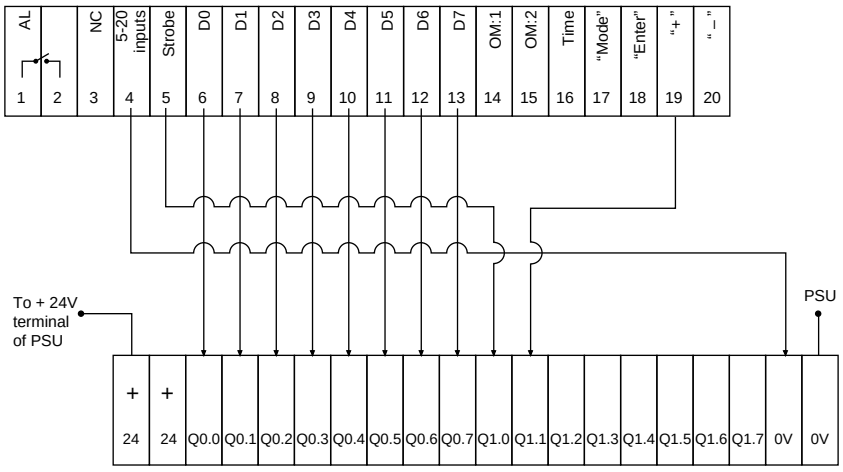


S5-100U PLC

Note: The strobe line is optional.

Parallel with variable data

Display, **RS** stock no. 629-358

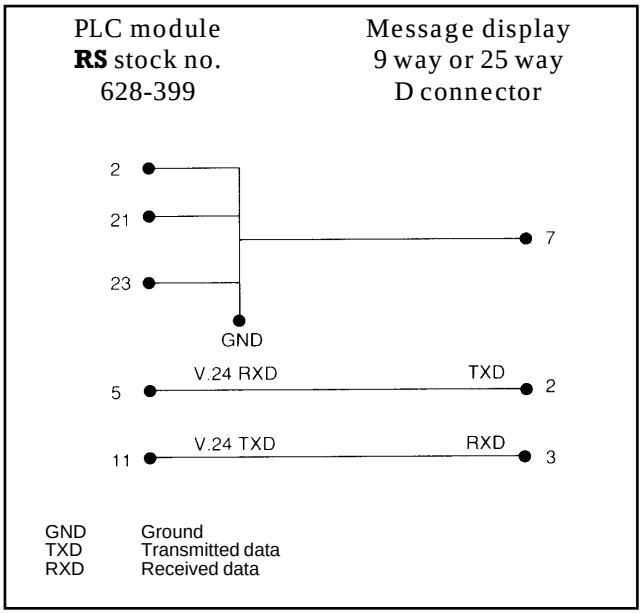


S5-100U PLC

Where relay output type PLC's are used, it is recommended that the diode network is used for the strobe and '+' inputs (Section 2.2.2.2).

Serial communication

The printer output/ASCII module, **RS** stock no. 628-399 is used, set to a common baud rate, maximum 2400 baud for RS-232C communications.



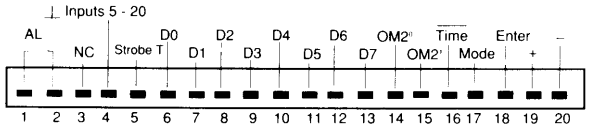
2.4 Specifications

	Small display	Large display
Display	Green fluorescent dot matrix	
Number of lines	One	Two
Characters per line	20	40
Character height	5mm	5mm
Character sets	ASCII, German, French, Swedish/Finnish, Danish/Norwegian, Cyrillic	
Text memory	CMOS-RAM 16K (inc. control characters)	
Number of texts	255 max (about 80, 175 character texts)	
Retention time	Typically greater than 10 years	
Text input	Via serial interface	
Text call options (Max. Text No. addresses)	Binary (255), BCD (99), Single (8) or Serial (255)	
Display modes	Four modes selected via setup menu	
Variable overlay	Via parallel or serial interface	
Control inputs	Active High +24V nom. (+15 to +30V) Low level 0 to +7V All lines are galvanically isolated	
Alarm relay	Single contact, 250Vac/2A, 30Vdc/2A	
Serial interface	110...2400 Baud, 7 or 8 data bits, 1 or 2 stopbits, all parity options	
	RS-232	RS-232/Current loop
Addressable	Up to 31 addresses. Max. no. of devices depends on the transmitter	
Power supply	24Vdc (19 to 36V) Approx. 6W, 1.5A peak	230Vac ±15% 110Vac ±15% } 45/65Hz, 10VA 24Vdc (19 to 36V)
	Galvanically isolated	
Ambient conditions		
Storage temp. range	–40 to +80°C	
Operating temp. range	0 to +50°C	
Housing type	Front sealed to IP 65 (DIN 40050)	
Dimensions		
Bezel size	144 × 36mm	288 × 72mm
Depth behind panel	153mm	115mm
Panel cut-out	138 × 33mm	282 × 68mm
Panel fixing	Clip-in mounting brackets (supplied)	
Weight	450g	900g
Connections		
Control inputs and supply	Plug-in screw terminal blocks (supplied)	
Serial interface I	3 way Burndy	9 way D-sub plug
Serial interface II	9 way D-sub plug	25 way D-sub plug

2.5 Connections

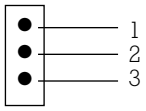
2.5.1 Rear control input connector

For the parallel date interface, external selection of the operating mode, remote control of the key functions and the alarm relay output. These connections are the same for both models.



Al	collective alarm = output relay
NC	no connection
D0 ...D7	8 control lines for text selection and variable overlay
Strobe T	transfer pulse
OM:2^0 ... OM:2^1	external selection of four operating modes
MODE, ENTER, +, -	remote control
TIME	no output of date and time at text call
⊥ Inputs	GND For control lines 5-20

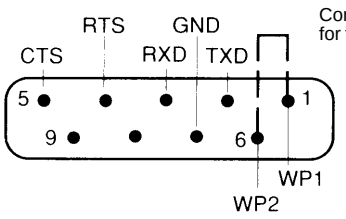
2.5.2 Front serial Interface I – **RS** stock no. 629-342



3-way plug
(type Burndy MMH 3-1)

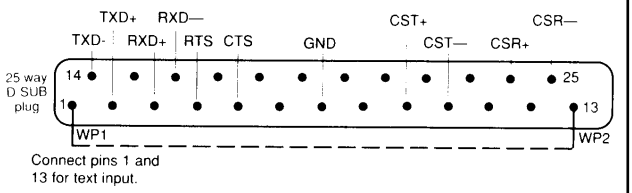
Pin	Signal	
1	TDX	transmitted data
2	RXD	received data
3	GND	ground

2.5.3 Front serial Interface I – **RS** stock no. 629-358
Front serial Interface II – **RS** stock no. 629-342



Pin	Signal	
2	TDX	transmitted data
3	RXD	received data
4	RTS	request to send (at signal "high" ready to receive)
5	CTS[1)]	clear to send
7	GND	ground

2.5.4 Rear serial Interface II – **RS** stock no. 629-358



Pin Assignment

	Pin	Signal		
RS-232C	2	TXD	transmitted data	
	3	RXD	received data	
	4	RTS	request to send ("high" ready to receive)	
	5	CTS[1)]	clear to send	
	7	GND	ground	
Current loop (active)[2)]	9	CST+	current source transmit	+20mA
	10	CST-	current source transmit	-20mA
	24	CSR+	current source received	+20mA
	25	CSR-	current source received	-20mA

Notes:
1. CTS has to be logically high (+3 . . . +12V) to make the transmission of data possible. The interface is ready for transmission even if the CTS-input is not wired because the input is pulled high internally by 3kOhm to +5V.
2. There will be no communication between two devices with active interfaces if current loop (active) is used.

3. Input scanning interface (ISI)

3.1 Functions

The input scanning interface cyclically checks the max. 255 control inputs, processes the determined status of the input lines according to the selected operating mode and outputs the message text number in parallel and in serial.

The cycle time depends on the number of slaves and the number of messages recognised in a slave.

The cycle time of 50ms (no messages active) is extended by up to 60ms per slave at full workload (64 messages active).

The four message display operating modes plus an additional ISI 64 specific operating mode are possible. The operating modes of the ISI 64 and message display must be matching, since the actual processing of the information is carried out in the message display.

3.1.1 Function mode Come/Go

If the function mode FM C/G (SW5) is set to OFF, the ISI reacts to rising edges at the inputs only. If FM C/G is set to ON, it reacts to falling edges as well.

For this purpose the inputs 'T33...T64' are deactivated and assigned a going message by software. If the function is active (Come/Go), the number of possible active inputs is reduced to 32. Each falling edge at the inputs 'T1...T32' triggers the output of the text number 'T +32'. This message text number can be assigned a going message in the text display.

eg.
Coming message No. 2 . . . Going message No. 34
Coming message No. 10 . . . Going message No. 42 . . .

As opposed to the coded triggering, which allows only one text number to become effective at the control inputs, the signal triggering also allows the simultaneous activation of several messages. This also shows the differences in the individual operating modes: the following is valid for all operating modes: A single activated input (ie. no other input is active at the same time), is output as a text number.

3.1.2 Operating mode OM:0

If several inputs are simultaneously activated, only the text with the highest priority (= highest text number) is output.

When the input corresponding to this text number falls, the input with the next highest text number is determined and the corresponding text is output. If there are no more active inputs, the text number 0 is output.

3.1.3 Operating modes OM:1 and OM:2

If several inputs are simultaneously activated, all messages in this group are output in ascending order.

3.1.4 Operating mode OM:3

If several inputs are simultaneously activated, the procedure is the same as for OM:1, OM:2.

A going message is deleted from the message display stack by means of the signals 'ST' and '–'. However, this is only possible for parallel connection of the message display.

3.2 Output of message text numbers and communication

The ISI is equipped with two interfaces to peripheral devices; parallel (8 bit + Strobe) and serial (RS-232). These interfaces can be simultaneously used. Two output formats are available: the format Standard (SW5 OFF) for the display etc. and the format IPP OUT (SW5 ON) especially for the protocol printer IPP 144-40E with a maximum of 15 possible message texts (not supplied by RS). The operating mode of the display can be controlled from the ISI master via 'OM:2^0-OUT' and 'OM:2^1-OUT', provided that the display is set to OPERATING MODE 'EXTERNAL'.

3.2.1 Parallel data out

For the parallel output of text numbers to the message display.

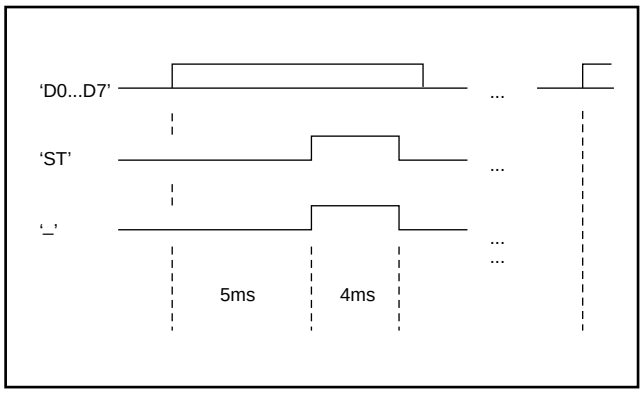
Via the connections:

['D0...D7', 'ST', '-', 'OM:2^0-OUT', OM:2^1-OUT', '⊥']

of the D-Sub jack, the main connection for control of the display is made.

The text numbers are output as binary code by 'ST'.

Timing for parallel data out:



Only one text number is output per cycle.

3.2.2 Serial RS-232C

For the serial output of text numbers to display, PC etc.

The text numbers are output via the D-Sub jack:

Pin 2(TXD), 4(RTS), 5(CTS), 7(⊥).

The data format is fixed: 8 bit, no parity, 1 stopbit

The following baud rates can be selected: 1200Bd, 2400Bd, 4800Bd and 9600Bd.

The output format of the text number is always a three-digit ASCII-coded number followed by the end character ‹CR›.

eg. Text number: 1 Output 001‹CR›
Text number: 35 Output 035‹CR›...

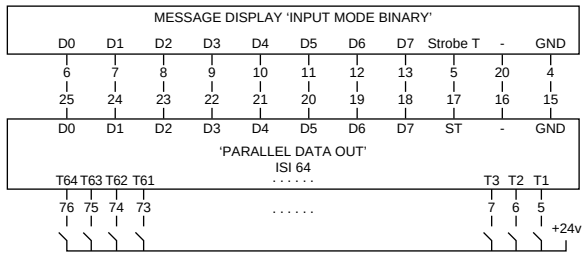
Serial connection to the display or the PC is established at the interface by means of the usual wiring.

Pin 2	TXD	Send data
Pin 3		Not assigned
Pin 4	RTS	Request to send
Pin 5	CTS	Clear to send (Pull up 3,3kΩ)
Pin 7	GND	Ground

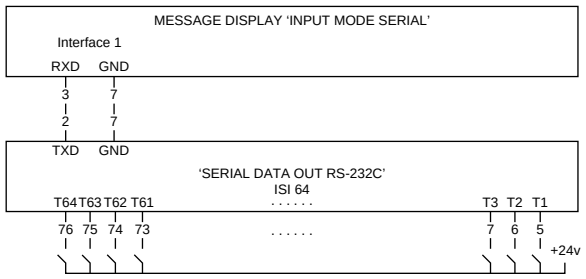
Serial connection master-slave ‹–› slave-master is made at the master-slave interface (terminals 41,42,4) of the Phoenix connector. Ground connection is terminal 4 (Section 3.3).

3.2.3 Connection examples ISI 64 to message displays

Parallel



Serial



3.3 Master-slave operation

If more than 64 inputs are required, you can connect up to 3 slaves to a master. The number of inputs is increased by 64 per slave with the exception of slave 3 where only 63 inputs are possible, since max. 255 text numbers are allowed. Terminal 76 is ignored.

Procedure:

– Each slave must be accordingly addressed (4.3 SW1/SW2).

→ It must be observed that each address is assigned only once and only one master is defined.

→ If all the devices use the same 24Vdc supply, do not connect the ground of the interface (terminal 4).

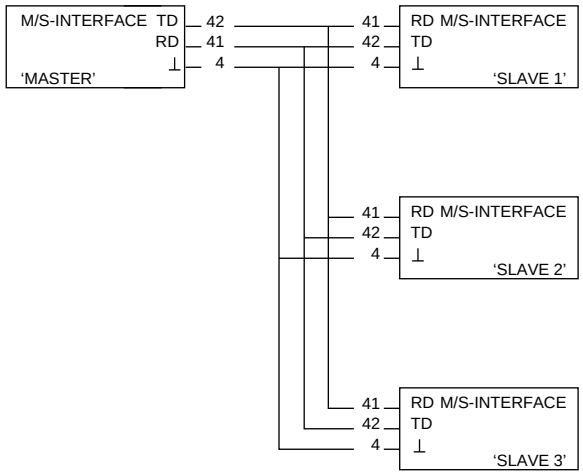
– It is not necessary to set the operating modes on the slaves. This is automatically carried out by the master via the serial communication.

★ The function mode 'Come/Go' must be directly set on each slave, if necessary.

★ After configuring the slaves can be connected to the master at any time.

★ The connection is made at the master-slave interface according to the following diagram.

Master-slave connection diagram



3.4 DIP switches

There are 8 DIP switches on each input scanning interface.

SW1	SW2	Master/Slave operation
OFF	OFF	Device is master (basic/central unit)
ON	OFF	Device is slave with address 1 (extension)
OFF	ON	Device is slave with address 2 (extension)
ON	ON	Device is slave with address 3 (extension)

SW3	SW4	Baud rate serial interface
OFF	OFF	1200 Baud → for message display
ON	OFF	2400 Baud → for message display
OFF	ON	4800 Baud
ON	ON	9600 Baud

SW5 Output mode ON → IPP 144-40E printer format
OFF → Standard format

SW6 ON → Function mode 'COME/GO', (FM 'C/G') ON
OFF → Function mode 'COME/GO', (FM 'C/G') OFF

SW7	SW8	Operating mode
OFF	OFF	OM:'0'
ON	OFF	OM:'1'
OFF	ON	OM:'2'
ON	ON	OM:'3'

The ISI is delivered with the following default settings:

SW1/SW2: Master
SW3/SW4: 1200Bd,
SW6: FM'C/G' OFF
SW7/SW8: OM:'0'

→ In master-slave operation it must be observed, that each address is assigned only once and that one master is defined.
Function mode 'Come/Go' is not possible in operating mode 0.

→ Remote control of the operating mode via the inputs 'OM:2^0' (No. 39), 'OM:2^1' (No. 40) is possible only, if SW7, SW8 are set to OFF.

3.5 Technical data

Power supply	ac power supply unit: 230V ±15% configurable by soldering jumpers to 115V ±15% 50Hz ±10% 5VA and dc power supply unit: +21V...+36V 5W Starting current: 2A, for 5ms (Uh dc + =36Vdc) 1.2A, for 5ms (Uh dc +=21Vdc)
Environmental conditions	Storage temp.: –40°C...+80°C Operating temp.: 0°C...50°C
Interference immunity	acc. to IEC 801-4
Protection class	Housing IP40, connectors IP20
Interfaces	PARALLEL DATA OUT 10 bit: 8 data, 2 strobe Level: 24Vdc, short-circuit-proof, Output resistance = 100Ω, SERIAL RS-232C: 1200...9600Bd, 8 bit, no parity, 1 stopbit MASTER/SLAVE 9600Bd, 8 bit, no parity, 1 stopbit
Inputs	64 message inputs 2 operating mode inputs Level: 24Vdc (+15V....+36V), Input resistance = 10KΩ All ⊥-terminals are electrically connected
Outputs	2 operating mode outputs 'OM:2^x-OUT' Level: 24Vdc, short-circuit-proof, Output resistance = 470Ω, 'U_H OUT 24Vdc' if supplied with 'U_H DC+' = +26Vdc and U_H AC internally stabilised, short-circuit-proof
Maximum cable lengths	parallel: max. 100m serial: up to 30m, depending on the baud rate Master/Slave: 15m
Dimensions	295mm × 95mm × 65mm
Weight	approx. 600g
Supplied with	1 × 35mm-T-rail, 290mm long 4 × screw terminal connector, 20-pole

4. Operator keyboard

4.1 Functional description

The operator keyboard has two basic control modes: parallel or serial (for inputs and outputs). These can be simultaneously used. Outputs are always parallel and serial. In addition, the keyboard has DIP switches on the rear for configuration.

SW1 defines the format of the numeric output: ASCII or integer (8 bits). It takes effect in case of parallel connection only.

SW2 defines the usage of the control lines: Strobe In for parallel, CTS for serial. This influences the period of time for which the data shall be electrically available at the terminal and whether they have to be buffered.

A second group of 'DIP switches' is used to manipulate the normal RS-232 parameters.

These switches take immediate effect and are valid for each power on.

4.2 Parallel connection

4.2.1 Function keys [F1] ... [F8] and [↑] [F1] ... [↑] [F8]

The actuation of one of the function keys [F1] ... [F8] initiates an output via the parallel outputs FD0...FD3, the parallel outputs D0...D7 as well as via the serial interface. The simultaneous actuation of [↑] and [F1] ... [F8] makes 8 additional function calls available.

Key code table for parallel outputs

Key	Outputs: FD3...DFD0 (HEX)	Outputs: D7...D0 (HEX)	(DEC)
[F1]	01	11	17
[F2]	02	12	18
[F3]	03	13	19
[F4]	04	14	20
[F5]	05	15	21
[F6]	06	16	22
[F7]	07	17	23
[F8]	08	18	24
[↑] [F1]	09	21	33
[↑] [F2]	0A	22	34
[↑] [F3]	0B	23	35
[↑] [F4]	0C	24	36
[↑] [F5]	0D	25	37
[↑] [F6]	0E	26	38
[↑] [F7]	0F	27	39
[↑] [F8]	00	28	40
no key	00	00	00

The function [↑] [F8] is only useful for the serial output or the data lines D7...D0.

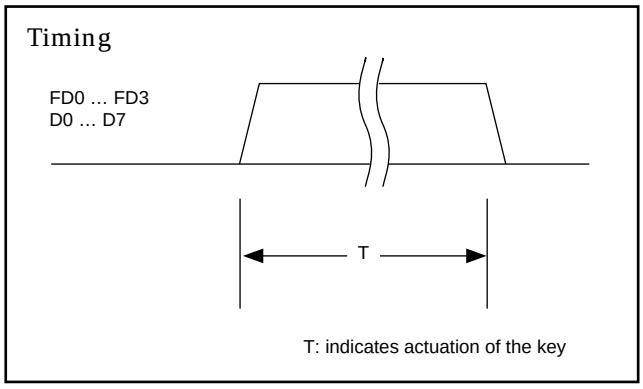
The output of data can be carried out buffered or unbuffered.

Note: [↑] [F1] means; actuate [F1] with [↑] depressed.

Unbuffered output

'Strobe In' (SW2) in 'OFF' position

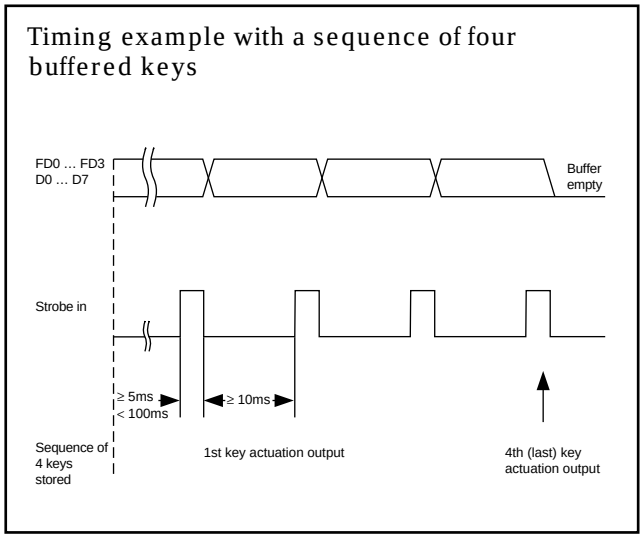
On actuation of a key the outputs FD0...FD3 or D0...D7 are active as long as the key remains depressed.



Buffered output

'Strobe In' (SW2) in 'ON' position:

On actuation of a function key the outputs FD0...FD3 and D0...D7 are activated. They remain active until the data transfer has been confirmed via the 'Strobe In' input line. Additionally actuated keys are buffered: first in, first out stack principle (max. 15) and are output sequentially depending on the read cycle.

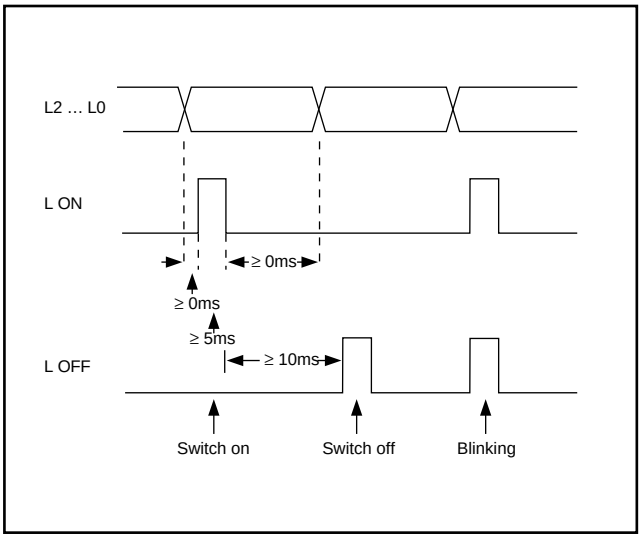


The pending data are deleted or replaced by falling edges.

The entire stack is deleted by a strobe time of more than 100ms.

4.2.2 Status LEDs

8 LEDs, which are assigned to the function keys [F1] ... [F8], are available for status indications. The LEDs can be switched to ON, OFF or BLINKING. 3 data inputs L0...L2 (address) and 2 control inputs L ON and L OFF are used to specify when and in which mode the LEDs shall be active.



The data inputs define which LED shall be activated:

The binary LED code minus one is to be entered

	L2	L1	L0
FL1	0	0	0
FL2	0	0	1
FL3	0	1	0
FL4	0	1	1
FL5	1	0	0
FL6	1	0	1
FL7	1	1	0
FL8	1	1	1

L ON and L OFF can rise or fall simultaneously with the data lines L0...L2.

4.2.3 Numeric keypad and control keys

Numeric keypad: [0] , [1] ... [9] , [–] , [,]

Control keys: [↑] , [↓] , [←] , [→] , [CLR] , [ENTER]

Actuation of these keys initiates the parallel output of data via the data lines D0...D7, depending on the setting of SW1. (The lines FD3...FD0 remain unchanged.)

*The data is output in ASCII format, if the DIP switch 'format' (SW1) at the rear is set to ASCII.

Numeric output with switch set to ASCII

Key	D7...D0 (HEX)	Key	D7...D0 (HEX)
0	30	–	2D
1	31	.	2E
2	32	↓	0A (LF)
3	33	←	0B (BS)
4	34	→	0C (FF)
5	35	CLR	7F (DEL)
6	36	ENTER	0D (CR)
7	37		
8	38		
9	39		

*The data is output in binary format, if the DIP switch 'format' at the rear is set to INT (integer) . .

If the numeric keys (1, 2...9, 0,., -) are actuated in this operating mode, the characters are not individually output, but are output as an integer number, after actuation of [ENTER] .

The numbers can be in the range of 0...+255 or –128...+127.

The data are output to the data lines D0...D7.

The corresponding hexadecimal code is:

Parallel output of integers (8 bits)

Decimal input	0	.....	127	128	129	.....	255
or	0	.....		-128	-127	.....	-1
Hex output D7...D0	0	.....	7F	80		.....	FF

Max. 3 figures can be entered before [ENTER] plus optionally '+' or '–'. Entries exceeding the valid range of numbers are not accepted and indicated by a long bleep.

The keys [←] , [↓] , [→] have no function in this operating mode. Incorrect entries can be deleted using [CLR] (before actuation of [ENTER]). Then you can repeat the entry. An entry must always be terminated by [ENTER] . The functions of the function keys [F1] ... [F8] can be used during the entry.

Also in this operating mode the data are output buffered or unbuffered, depending on the settings of switch SW2.

4.3 Serial connection

4.3.1 Function keys [F1] ... [F8] and [↑] [F1] ... [↑] [F8]

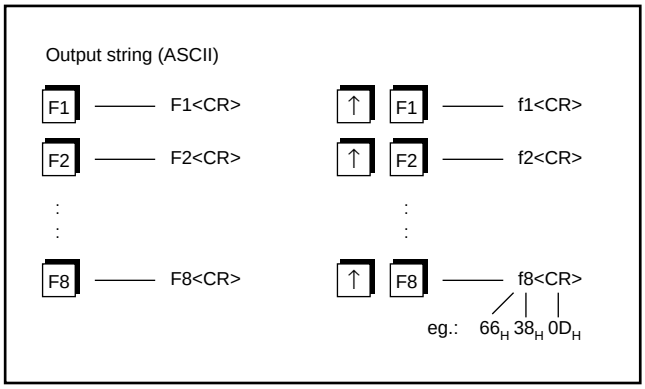
The output of data via the serial interface RS-232 depends on the setting of the DIL switch (2) 'Strobe In'.

The DIP switch 'Format' has no effect in the serial connection but the switch 'Strobe In' influences the format of the output data.

'Strobe IN': OFF – unbuffered output

Immediately after actuation of a key as a character string according to the following table:

String output with 'Strobe In' switch set to OFF



In this switch position the CTS input is functionless.

'Strobe In': ON – buffered output

If the CTS signal is set to 1, the output takes place upon actuation of a key. If CTS is set to 0, ie. 'receiver is busy' the data to be output are buffered.

For a more efficient use of the device's buffering capability, the function keys only occupy 1 byte. The codes output correspond to those of the parallel outputs.

Max. 15 characters assigned to the keys are stored.

String output with 'Strobe IN' set to ON

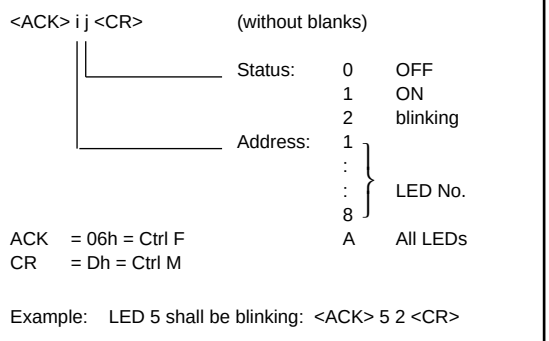
Key	HEX	Terminal keyboard	ASCII
F1	11H	Ctrl Q	XON
F2	12H	Ctrl R	DC2
F3	13H	Ctrl S	XOFF
F4	14H	Ctrl T	DC4
F5	15H	Ctrl U	NAK
F6	16H	Ctrl V	SYN
F7	17H	Ctrl W	ETB
F8	18H	Ctrl X	CAN
↑ F1	21H		!
↑ F2	22H		"
↑ F3	23H		#
↑ F4	24H		$
↑ F5	25H		%
↑ F6	26H		&
↑ F7	27H		'
↑ F8	28H		(

Note: It must be ensured that your serial board does not interpret this code, eg. XON or XOFF as software handshake.

4.3.2 Control of the LEDs

The LEDs are controlled by the following control sequence:

LED control codes

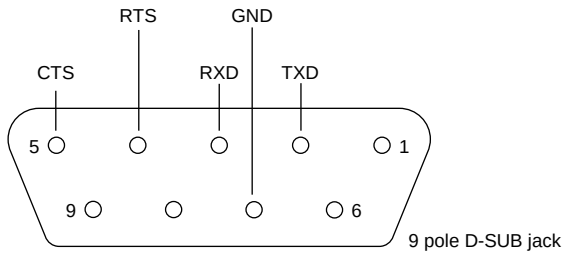


CR initiates the blinking.

Strings which are not in this format have no effect.

4.3.3 Serial communication pin connection

RS-232 Interface



Pin	Signal	Significance
2	TXD	Send data
3	RXD	Receive data
4	RTS	Request to send (at signal level 'high': ready to receive)
5	CTS	Clear to send (at signal level 'high' or unused pin, data are transmitted; at signal level 'low' not data are output
7	GND	Ground

- The baud rate is set at the rearside DIP switch (1200, 2400, 4800, 9600Bd)
- Data format: 8 bit, 1 stop bit, no parity
- RTS is always resulted to 'high' (1).

4.3.4 Numeric keypad and control keys

Depending on the setting of the 'Strobe In' switch, data are output as individual figures or as a sequence of figures.

■ 'Strobe In' set to 'disable'

The ASCII code is output according to the table in 4.3.1:

Example: Key 7
ASCII value: 37

■ 'Strobe In' set to 'enable'

The key sequence is internally buffered, possibly with function keys, as long as CTS is 0.

The transmission is locked and the characters are stored in the output buffer (max. 15 characters) until CTS is again vacant. Then the characters are output.

Numeric output codes

Key	ASCII character value	HEX value
1	1	31
2	2	32
3	3	33
4	4	34
5	5	35
6	6	36
7	7	37
8	8	38
9	9	39
0	0	30
-	–	2D
.	.	2E
↓	(LF)	OA
←	(BS)	OB
→	(FF)	OC
CLR	(DEL)	7F
ENTER	(CR)	OD

4.4 Operational safety functions

4.4.1 Locking the input keys

To prevent unauthorised operation the keyboard keys can be locked in three stages. The locking stage is selected via the control inputs LOCK A and LOCK B.

	LOCK A	LOCK B	Significance
Locking stage 0	1	1	all keys unlocked
Locking stage 1	0	1	F1 ... F8 and ↑ F1 ... ↑ F8 unlocked, all other keys locked
Locking stage 2	1	0	F1 ... F4 and ↑ F1 ... ↑ F4 unlocked, all other keys locked
Locking stage 3	0	0	All keys locked

1≙ +24Vdc

0≙ 0Vdc or not connected

Unlocking:

★ For entries during operation, the lock can be undone by simultaneous actuation of the keys CLR, 6 and 0. This is a kind of password.

★ Via the serial interface by (DEL) 6 0 (CR); ie. 7F 36 30 0D. The unlocking is announced by a short acoustic signal.

Relocking:

The locked status is restored by actuating the key ENTER twice in a row or via the serial interface using the command (DEL) 6 1 (CR).

4.4.2 Echo output

A character received via the serial interface is output as an echo signal. This makes it easy to check the function of the interface during operation. Each character sent from the control unit is returned unchanged and can be compared with the original.

4.4.3 Acoustic signal: Beep

The actuation of unlocked input keys is acknowledged by a short beep. A longer beep indicates an error. Remote control: only for serial interface: after the character 07h (Ctrl G).

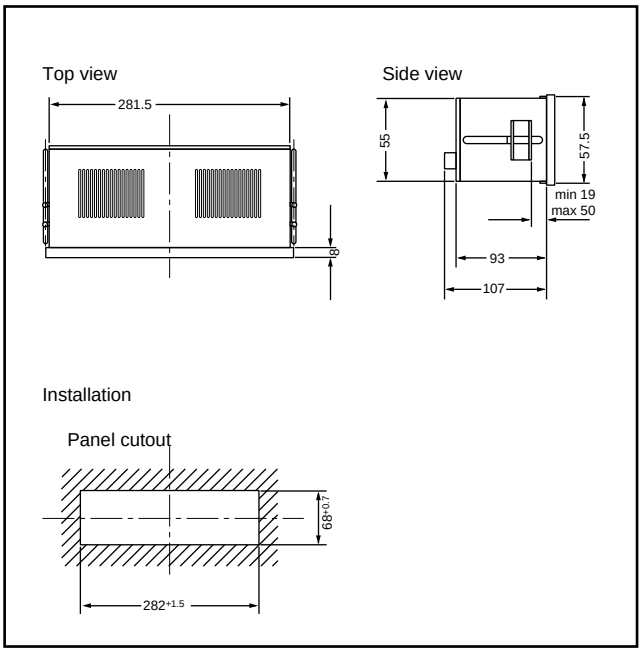
4.5 Labelling strip

The function keys F1 ... F8 can be labelled according to their individual functions on the supplied strip.

After labelling, the strip is inserted under the cover plate from the left hand side.

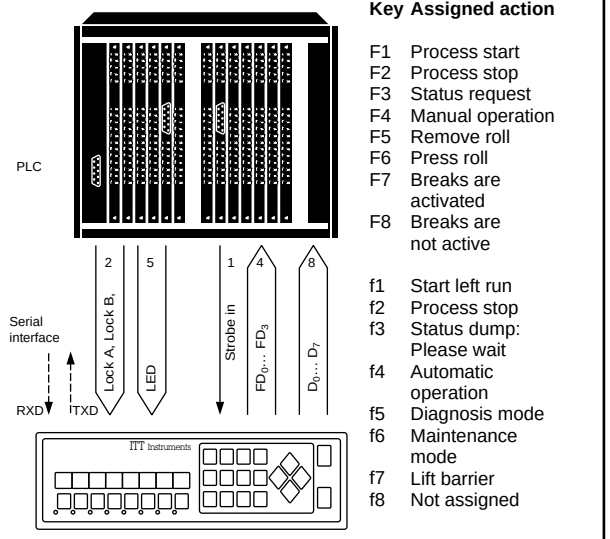
Once the labelling has been finally determined, the protective paper strip should be removed to achieve complete tightness.

4.6 Dimensions and installation



The keyboard is a panel mounting device acc. to DIN. It is inserted into the switch panel cutout from the front and is tightened to the switch panel rear by means of the lateral clamp bolts. The switch panel thickness must not exceed 50mm.

4.7 Application example



Key	Assigned action
F1	Process start
F2	Process stop
F3	Status request
F4	Manual operation
F5	Remove roll
F6	Press roll
F7	Breaks are activated
F8	Breaks are not active
f1	Start left run
f2	Process stop
f3	Status dump: Please wait
f4	Automatic operation
f5	Diagnosis mode
f6	Maintenance mode
f7	Lift barrier
f8	Not assigned

The above figure shows the maximum connection possibilities to the PLC; max. 1.5 byte inputs and 1 byte outputs on the PLC are required.

4.8 Technical data

Power supply

ac or dc power supply unit:

ac:	230V	±15%	45 to 55Hz can be changed (soldering) to:
	115V	±15%	45 to 55Hz (optional)
			Power consumption: 8VA
dc:	24V		min: 21V max. 36V
			Power consumption: 3W

Environmental conditions

Storage temp.:	–40°C to +80°C
Operating temp.:	0°C to 50°C
Climate class:	Class II (acc. to VDE 3540)
Interference immunity:	acc. to IEC 801-4
Insulation:	Protection class II (acc. to VDE 0411)
Protection class:	Front-side: IP65
	Connector: IP20

Interfaces

Parallel outputs:

Level 1 > 20V	@ Uh = 24V
Level 0 < 3V	
Isink: –10mA (fan out)	

Parallel inputs:

Level 1 > 15V	@ Uh = 24V overload: 30V
Level 0 < 5V	
Iih = 1mA	@ Vih = 24V

Serial interface: RS-232
Selectable: 1200, 2400, 4800, 9600Bd
8 bits, no parity, 1 Stop bit
CTS enable/disable, Output buffer: 15 characters
RTS not used

Voltage source

Uh OUT

@ Uh = 24Vdc	Uhout = 22Vdc
@ Uh = 230Vac	Uhout = 24Vdc

short-circuit proof
max. load: 5mA

Mechanical data

Installation in DIN cutout using clamp bolts
Dimensions: 288mm × 72mm × 95mm
Weight: approx. 500g
Parallel interface:
14 pin screw terminal connector Phoenix MSTB 1.5*
8 pin screw terminal connector Phoenix MSTB 1.5*
Power supply:
2 pin screw terminal connector Phoenix MSTB 1.5*
Serial interface: 9 pole DSub connector.

*These connectors supplied.

5. Message display for use with Siemens' PLC

This display is used in the same applications as the general purpose displays, but can be used with a Siemens' PLC. The display has a similar outward form and message storage as the other displays, but the message calling is completely different, so there is no real difference seen by the operator but for the installer and programmer it is much quicker.

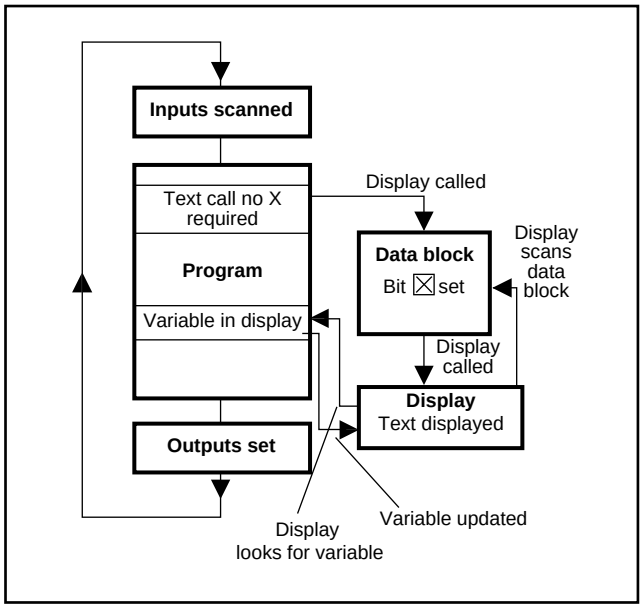
Some of the practical benefits:

- **All message calling is done by the display looking into a programmed data block (FB) in the PLC**. This frees the PLC from I/O message handling except for setting the correct bit within the PLC and so reducing the message display update time to be almost instantaneous
- The **PC based programming software** is a user friendly mouse driven, pull down menu type similar to many well known PC packages. Because of large memory within the display all the parameters can be set by the software directly so speeding initial set up and subsequent editing
- Up to **3 variable parameters** can be input in to any one message. These variables are set by the software setup. When the message is called the display searches the PLC program. There is a facility for simple scaling of this value between an upper and lower set point to give the operator an understandable reading. Variable types which can be used:

M	Internal relay
E	Input
B	Byte (not possible)
W	Word
K	Word in two's complement
T	Timer (not possible)
C	Counter
S	String

- **No extra** function block **programming or extra** Siemens' PLC **hardware is required**
- A **memory table** is used as a stack within the display. The message number can be recorded with the current data and time, and values of appropriate variables.
  Up to 127 messages can be stacked on a first in – first out basis (FIFO). On receipt of the 128th message, the first message is deleted.
  This feature is valuable for the operator or maintenance person to see all the message displayed for example when an alarm situation is developing. This table is lost on power off.

Schematic of PLC and display interaction



5.1 Data block format

The following table shows how the data block programmed into the PLC is formatted. This is the link between the display and the PLC. A bit set in the data block acts as a marker for the PLC to act on, for example, a function key from the operator keyboard, or the display to act on, for example, a text call or delete.

Bit 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0			Meaning
15 ... 0	DW 0 (w)	Function keys 15 - 0	Input to PLC from operator keyboard
	DW 1 (w)	Numeric keys	
	DW 2, DW 3, DW 4, DW 5 (w)	reserved	
	DW 6 (w)	Text acknowledgement	
	DW 7 (r)	Special functions	
16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1	DW 8 (r)	Text calls 16 - 1	A message is called
32 ... 17	DW 9 (r)	Text calls 32 - 17	
48 ... 33	DW 10 (r)	Text calls 48 - 33	
64 ... 49	DW 11 (r)	Text calls 64 - 49	
80 ... 65	DW 12 (r)	Text calls 80 - 65	
96 ... 81	DW 13 (r)	Text calls 96 - 81	
112 ... 97	DW 14 (r)	Text calls 112 - 97	
128 ... 113 (Text call marker field for incoming messages)	DW 15 (r)	Text calls 128 - 113	
144 ... 129	DW 16 (r)	Text calls 144 - 129	
160 ... 145	DW 17 (r)	Text calls 160 - 145	
176 ... 161	DW 18 (r)	Text calls 176 - 161	
192 ... 177	DW 19 (r)	Text calls 192 - 177	
208 ... 193	DW 20 (r)	Text calls 208 - 193	
224 ... 209	DW 21 (r)	Text calls 224 - 209	
240 ... 225	DW 22 (r)	Text calls 240 - 225	
- - - 253 252 ... 242 241	DW 23 (r)	Text calls 253 - 241	
	DW 24 (r)	LED status	LED confirmation on keyboard that PLC has processed function key input
	DW 25 (r)	Set point value - min. limit	Used with operator keyboard
	DW 26 (r)	Set point value - min. limit	
16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1	DW 27 (r)	Delete text 16 - 1	A message is deleted
32 ... 17	DW 28 (r)	Delete text 32 - 17	
48 ... 33	DW 29 (r)	Delete text 48 - 33	
64 ... 49	DW 30 (r)	Delete text 64 - 49	
80 ... 65	DW 31 (r)	Delete text 80 - 65	
96 ... 81	DW 32 (r)	Delete text 96 - 81	
112 ... 97	DW 33 (r)	Delete text 112 - 97	
128 ... 113 (Delete marker field for outgoing messages)	DW 34 (r)	Delete text 128 - 113	
144 ... 129	DW 35 (r)	Delete text 144 - 129	
160 ... 145	DW 36 (r)	Delete text 160 - 145	
176 ... 161	DW 37 (r)	Delete text 176 - 161	
192 ... 177	DW 38 (r)	Delete text 192 - 177	
208 ... 193	DW 39 (r)	Delete text 208 - 193	
224 ... 209	DW 40 (r)	Delete text 224 - 209	
240 ... 225	DW 41 (r)	Delete text 240 - 225	
- - - 253 252 ... 242 241	DW 42 (r)	Delete text 253 - 241	

(w) is written by display
(r) is read by display

For example:

Data word DW 8, Bit 0 calls Text 1
Data word DW 8, Bit 1 calls Text 2
Data word DW 8, Bit 15 calls Text 16
Data word DW 23, Bit 0 calls Text 241
Data word DW 23, Bit 3 calls Text 253.

5.2 Technical specifications

Designation	DAA 288-240 S		
Representation of characters			
Size of characters	5mm		
Characters per line	40		
Number of lines	2		
Character sets	ASCII-7 Bit, ASCII-8 Bits, German, French, Swedish/Finnish, Danish/Norwegian, Cyrillic		
Display mode	Fluorescent display, green		
Text input	via the serial interface		
Message memory			
Type	Flash-EPROM 28 F 512		
Memory size	64KB incl. control characters		
Text size	Max. 254 texts Moving text max. 175 characters		
Text call	Serial, PLC		
Display modes			
Operating mode	Primary value message, final value message, instantaneous value message, sequence message		
Variables			
Variable overlay	Serial, automatic		
Alarm			
Alarm outputs	Relay normally open 250Vac/2A, 30Vdc/2A		
Serial interfaces			
Type	RS-232 C and current loop active/passive		
Baud rate	110, 150, 300, 600, 1200, 2400 Baud		
Data size	7 or 8 Bit		
Stop bits	1 or 2		
Parity bit	Even, odd, mark (logical 1), space (logical 0), none (no parity check)		
Distance with shielded cable	RS-232 C 15m (300 Baud) TTY 150m (300 Baud)		
Power supply	24Vdc	230Vac	115Vac
Range	19 to 36V	±15%	±15%
Frequency		45 to 65Hz	45 to 65Hz
Power consumption	6W The values do not change when the optional keyboard DBT 288-01 S is connected	10VA	10VA
Fuse (MT)	2A	100mA	200mA
Environmental conditions			
Storage temperature	–40 to 80°C		
Operating temperature	0 to 50°C		
Climatic suitability	Climatic class 2 according to VDE/VDI 3540		
Protection type			
Housing	IP 65 as per DIN 40 050		
Mains line	IP 20		
Dimensions			
Width × height × depth	288 × 72 × 93mm		
Weight	About 0.9kg		
Connections			
Power supply	Terminal screw, eg. Phönix MSTB 1, 6/3-ST Grid 5		
Communication with SPS, Interface I	25-way Sub-D socket		
Text input, Interface II	25-way Sub-D socket		
Connection DBT-S Interface III	9-way Sub-D socket		

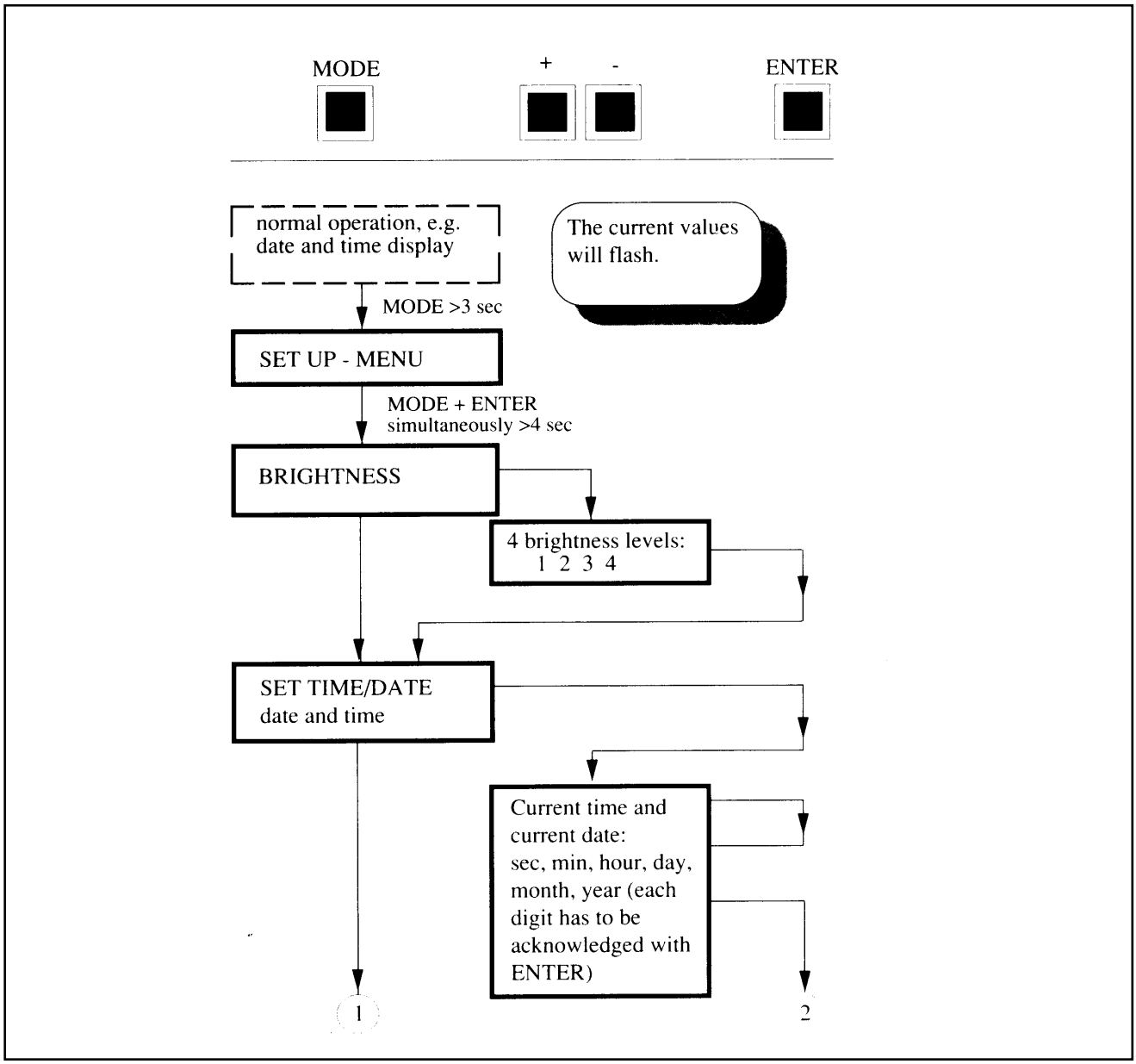
Appendix A – Setup menu for message displays, general purpose

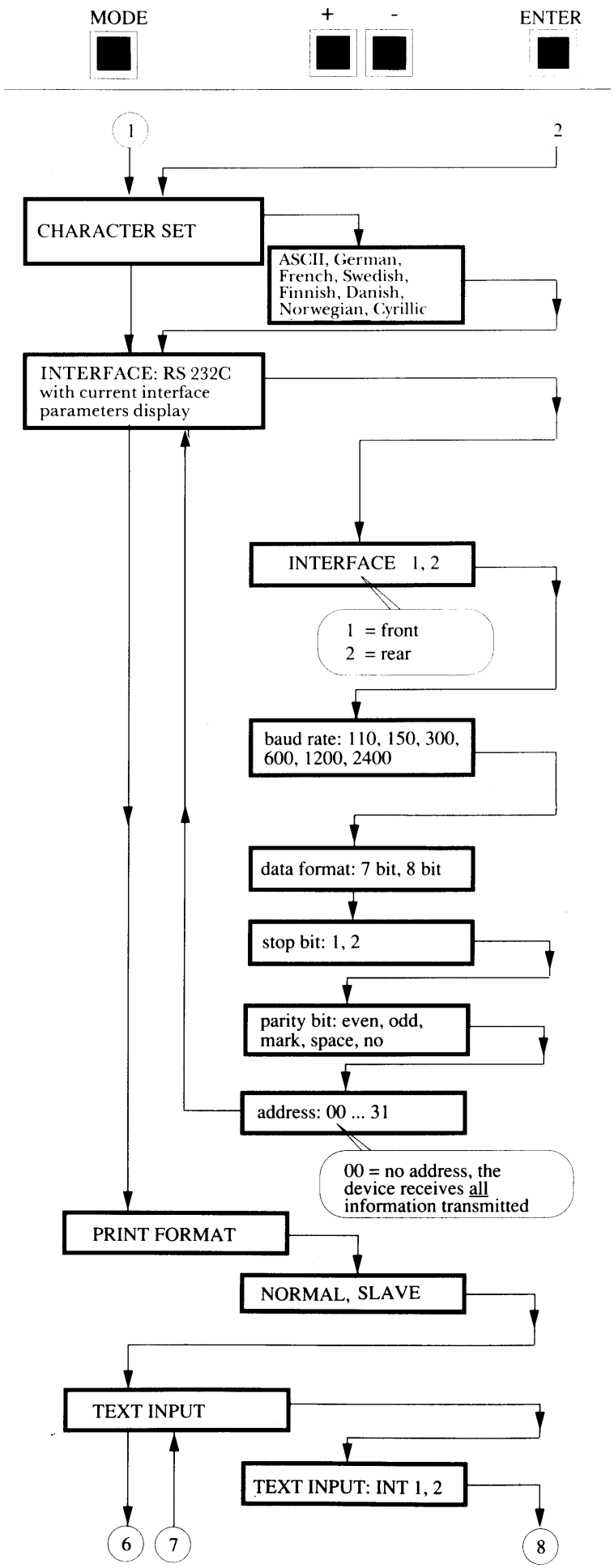
The setup menu is controlled by the four push-button keys on the front of the message displays. These are MODE, ENTER, +, –.

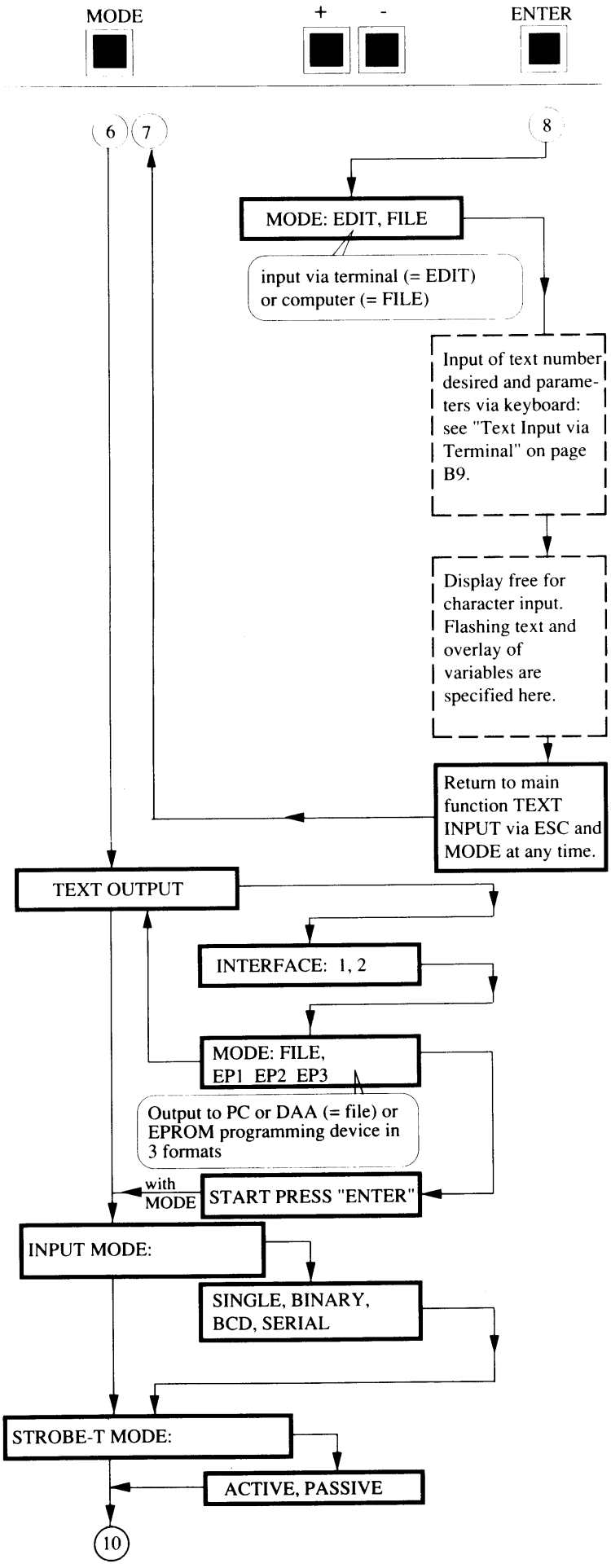
To check the setup menu configuration: Press the MODE key in and hold for at least 3 seconds. Successive presses on the MODE key will step through the menu displaying the current selections.

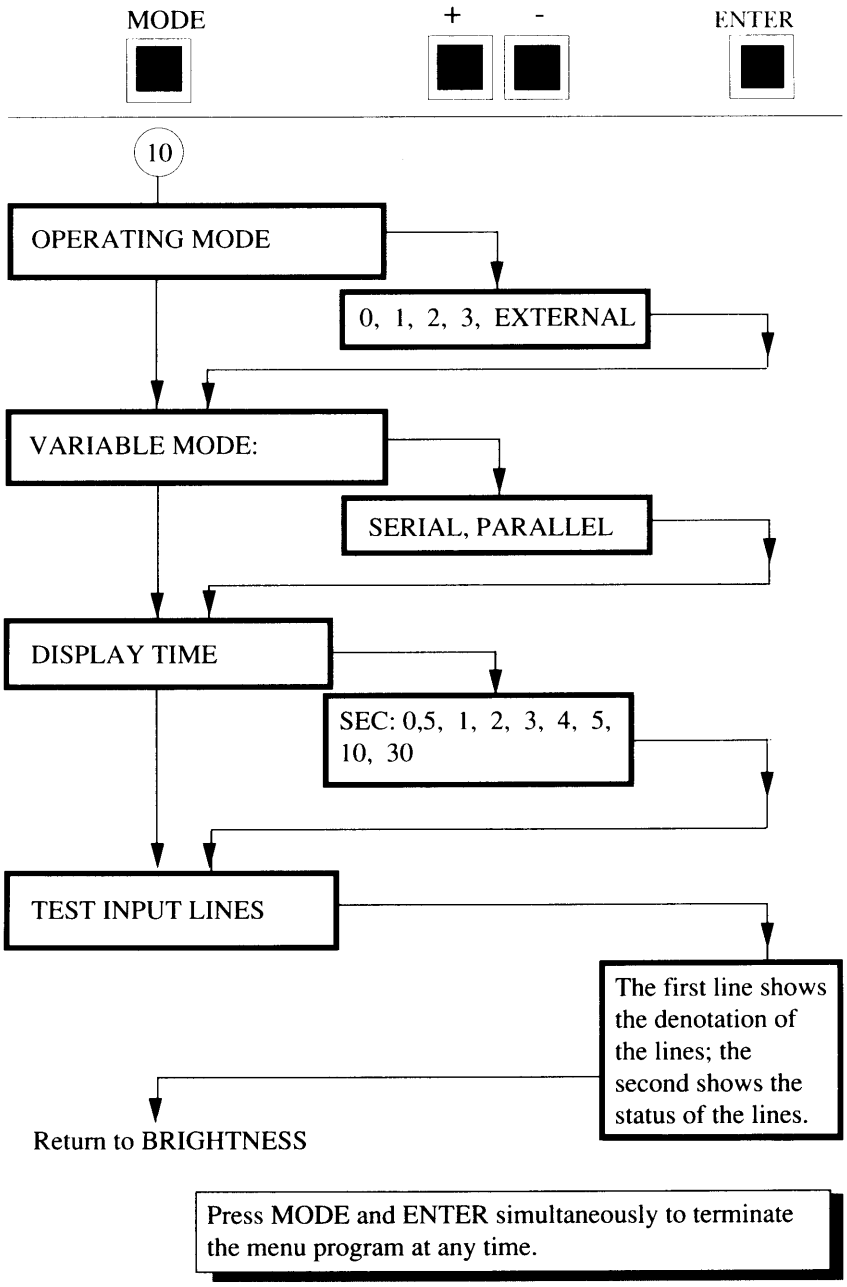
To change the setup menu configuration: First press and hold the MODE key for at least 3 seconds until the display changes to SETUP MENU. Then press both the MODE **and** ENTER keys at the same time, and hold down for at least 4 more seconds. After this time the display should change to BRIGHTNESS with the current setting flashing. Now the MODE key can be used to page through the main functions. The '+' and '–' keys are used to select the required option, which is confirmed by the ENTER key. This stores the selection in an EEPROM.

To exit the setup menu: Briefly press MODE and ENTER keys at the same time.




MODE
+
-
ENTER
1
2
CHARACTER SET
ASCII, German, French, Swedish, Finnish, Danish, Norwegian, Cyrillic
INTERFACE: RS 232C with current interface parameters display
INTERFACE 1, 2
1 = front
2 = rear
baud rate: 110, 150, 300, 600, 1200, 2400
data format: 7 bit, 8 bit
stop bit: 1, 2
parity bit: even, odd, mark, space, no
address: 00 ... 31
00 = no address, the device receives all information transmitted
PRINT FORMAT
NORMAL, SLAVE
TEXT INPUT
TEXT INPUT: INT 1, 2
6
7
8


MODE
+
-
ENTER
6
7
8
MODE: EDIT, FILE
input via terminal (= EDIT) or computer (= FILE)
Input of text number desired and parame-ters via keyboard: see "Text Input via Terminal" on page B9.
Display free for character input. Flashing text and overlay of variables are specified here.
Return to main function TEXT INPUT via ESC and MODE at any time.
TEXT OUTPUT
INTERFACE: 1, 2
MODE: FILE, EP1 EP2 EP3
Output to PC or DAA (= file) or EPROM programming device in 3 formats
with MODE
START PRESS "ENTER"
INPUT MODE:
SINGLE, BINARY, BCD, SERIAL
STROBE-T MODE:
ACTIVE, PASSIVE
10


MODE
+
-
ENTER
10
OPERATING MODE
0, 1, 2, 3, EXTERNAL
VARIABLE MODE:
SERIAL, PARALLEL
DISPLAY TIME
SEC: 0,5, 1, 2, 3, 4, 5, 10, 30
TEST INPUT LINES
The first line shows the denotation of the lines; the second shows the status of the lines.
Return to BRIGHTNESS
Press MODE and ENTER simultaneously to terminate the menu program at any time.

RS Components, PO Box 99, Corby, Northants, NN17 9RS
Telephone: 01536 201234
An Electrocomponents Company