

# TECHNICAL MANUAL

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## 1.0 - Introduction

### 1.1 - Description

Presys Auto-Manual / Auto / Manual Stations are microprocessor-based instruments for application in Instrumentation and Process Control.

They can communicate with computers by optional communication module RS-232 or RS-422/485.

The Auto-Manual / Auto / Manual Stations have been designed according to modularity and flexibility concepts. Both the Single Loop Station and Dual Loop Station, have a variety of standard output types, such as: voltage (1 to 5V, 0 to 10V) and current (4 to 20mA).

They are capable of monitoring two standard inputs: current (4 to 20 mA) and voltage (1 to 5V and 0 to 10V).

A 24VDC voltage source, isolated and with short circuit protection, is provided for transmitter power supply.

The type of input selected by the user is enabled by jumpers and by the software configuration. All configuration data can be protected by a password system, and are stored in the non-volatile memory in the event of a power failure.

They accept 90 to 240VAC or 130 to 340VDC (with any polarity) power supply. Other ranges are also available.

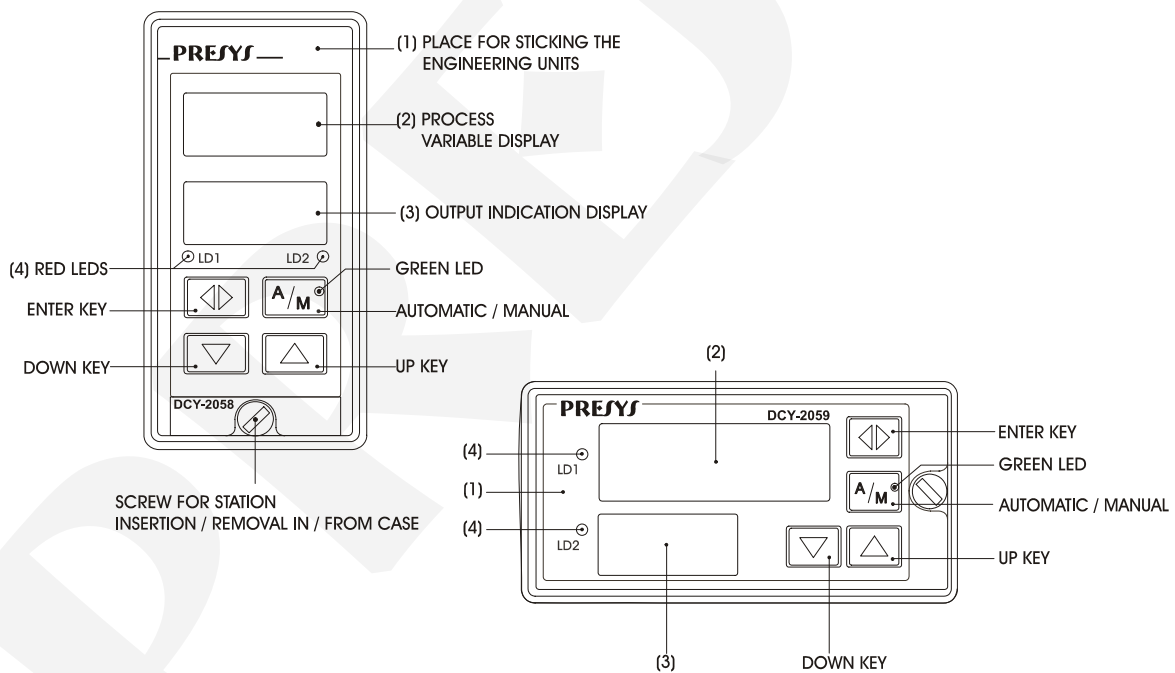


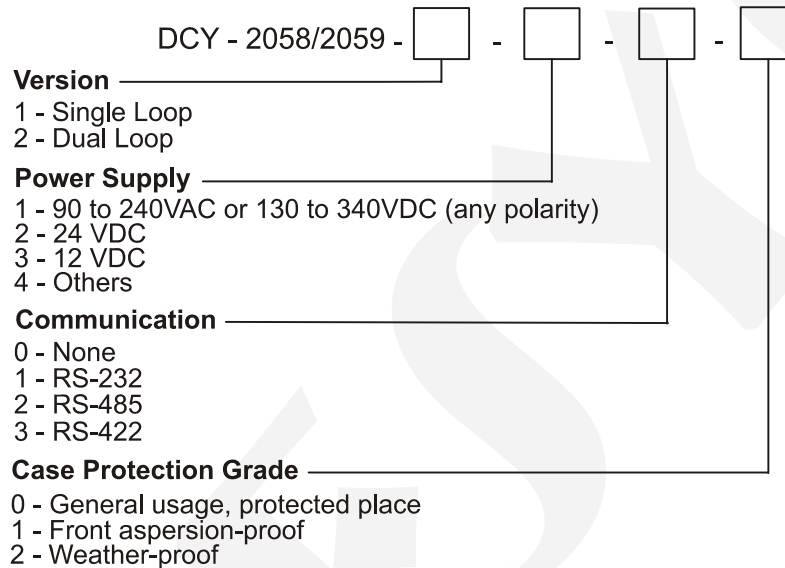
Fig. 1 - DCY-2058/2059 Stations Front Panels.

The instruments are housed in an extruded aluminum case which makes them highly immune to electrical noise, electromagnetic interference and resistant to the most severe and rough industrial use conditions.

On the instrument front panels there are two red displays jointly configurable with the decimal point for up to four high visibility digits. The function of the UP, DOWN and

ENTER keys for changing output values is described in section 3.1. The A/M key on the Stations front panel allows toggling between automatic and manual modes for the Auto-Manual Stations. The green led in the A/M key indicates, when illuminated, the Stations are in the manual mode and, when off, the Stations are in the automatic mode. In configuration mode both displays show mnemonics and parameter values. The pair of red leds are used as a visual indication that the input and output shown on the displays refer to loop 1 or 2.

### 1.2 - Order Code Number



Note 1: DCY-2058/2059 Stations configuration is described in detail by this technical manual and can be easily done by the user. If desired, specify the configuration so that the instrument is configured at **PRESYS**.

Note 2: Other hardware and software features can be available under previous consult.

Code Example:

DCY - 2058 - 2 - 1 - 0 - 0

This code defines a dual loop station, with power supply in the 90 to 240VAC or 130 to 340VDC range, not using communication and intended for use in a sheltered place.

### 1.3 - Technical Specifications

**Inputs:**

- Two inputs configurable for 4 - 20mA ( $R_{in} = 250\Omega$ ), 1 - 5VDC ( $R_{in} > 10M\Omega$ ) and 0 - 10VDC ( $R_{in} > 2M\Omega$ ). Table 1 shows the resolution for the linear input sensors.

Input Sensor	Range	Resolution
Voltage	0 to 5V	500 $\mu$ V
	0 to 10V	1mV
Current	0 to 20mA	2 $\mu$ A

Table 1 - Input Sensor Measuring Range

**Outputs:**

- One or two outputs for 4 - 20 mA (Maximum load of 750 $\Omega$ ), 1 - 5VDC and 0 - 10VDC. The outputs are galvanically isolated from inputs and power supply.

**Serial communication:**

RS-232 or RS-422/485 with isolation at 50VDC.

**Indication:**

Two red display sets with four digits which can be jointly configured with the decimal point.

**Configuration:**

By front panel push-buttons and internal jumpers.

**Scanning time:**

Single loop station: 64ms, display updated each 0.5s.  
Dual loop station: 120ms, display updated each 0.6s.

**Accuracy:**

$\pm 0.5\%$  of full scale for input indication and output generation.

**2-Wire Transmitter Power Supply:**

24VDC voltage and 50mA maximum, isolated from outputs, with short-circuit protection.

**Power supply:**

Universal 90 to 240VAC or 130 to 340VDC (any polarity), 10W nominal; 24VDC, 12VDC and other values are optional.

**Operating ambient:**

0 to 50°C temperature and 90% maximum relative humidity.

**Dimensions:**

1/8 DIN (48 x 96mm) and 162mm depth.  
45 x 92 mm panel cutout.

**Weight:**

0.5kg approx.

**Warranty:**

One year.

## 2.0 - Installation

### 2.1 - Mechanical Installation

The DCY-2058 and 2059 Stations front panels have 1/8DIN size (48 x 96mm).

They are fixed by the rails which press them against the back side of the panel.

After preparing a 45 x 92mm cut in the panel, remove the rails from the Station and slide its rear through the cut until its front reaches the panel. Place the rails again in the Station from the back of the panel and tighten the screws as shown in figure 2.

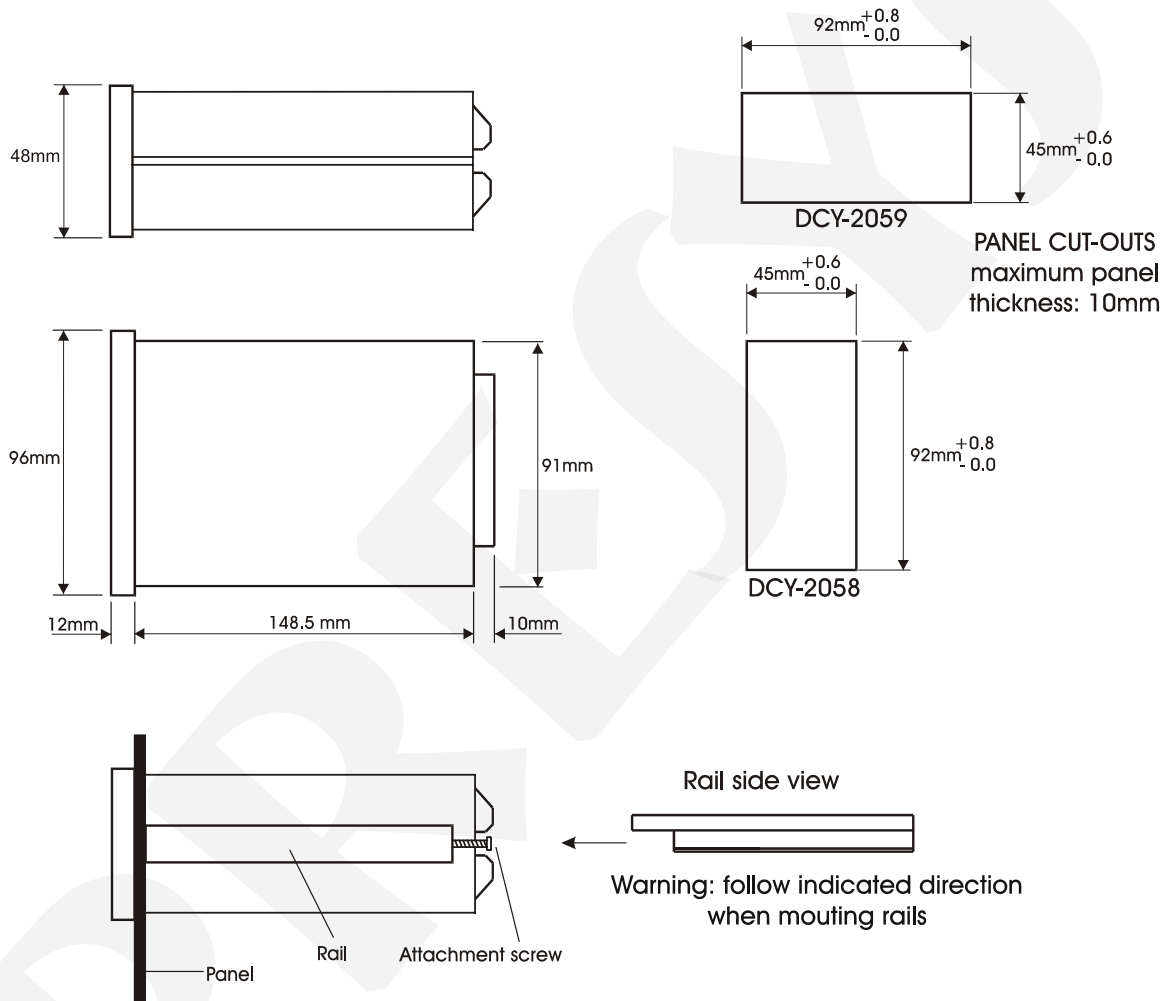


Fig. 2 - Dimensional drawing, panel mounting cutout and side view

### 2.2 - Electrical Installation

The DCY-2058 and 2059 Auto-Manual / Auto / Manual Stations may be powered by voltage between 90 and 240VAC or 130 to 340VDC (any polarity); 24VDC, 12VDC (for other models). Remember that the internal circuit is powered whenever the instrument is connected to the external power supply.

Input and output signals must be connected to the instrument only when it is turned off.

Figure 3 shows the instrument rear terminals for connection of power supply, ground, communication, process input and output signals.

Signal wiring must be kept far away from power wires.

Due to its metal case the instrument ground should be connected to earth ground. Never connect the ground to neutral terminal.

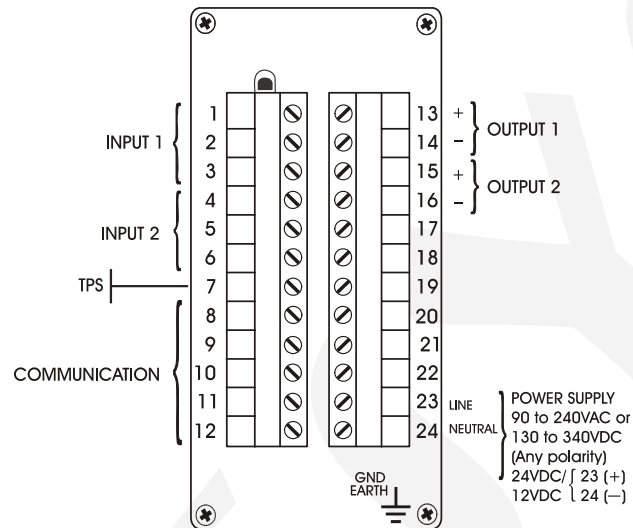


Fig. 3 - DCY-2058 and 2059 Station Terminals

### 2.3 - Process Input Signal Connection

The DCY-2058 and 2059 Auto-Manual / Auto / Manual Stations accept connection to mA or V in their standard inputs. In order to know the input sensor types and ranges refer to table 1, section 1.3 on Technical Specifications.

**A certain type of input sensor is enabled by means of internal jumpers (refer to section 4.2 on Hardware Configuration) and by the proper sensor selection in configuration mode (refer to section 3.2 on Configuration). Therefore, the connections explained below shall only become effective if the instrument hardware and software are correctly configured.**

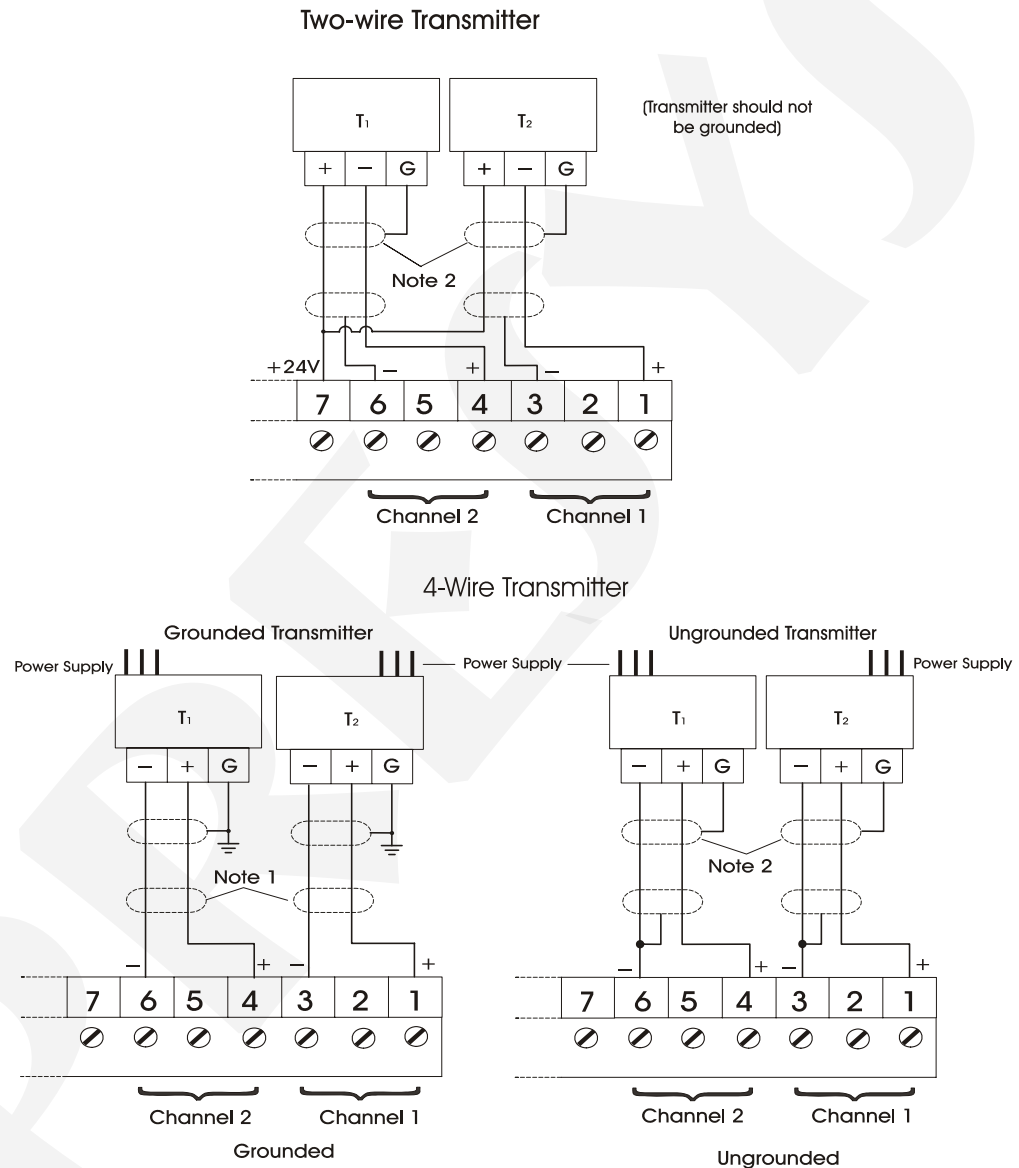
The connection of a certain type of sensor in input 1 does not restrict the simultaneous use of other sensor, of the same type or different, in input 2.

In order to avoid noise in the wiring, use twisted pair cable and pass sensor connection wires inside a metallic tube or use shielded cable. Make sure to connect only one shield wire end either to the negative terminal or to the earth ground of the sensor, as shown in the next sections.

**WARNING: GROUNDING TWO SHIELD WIRE ENDS MAY CAUSE NOISE IN THE INSTRUMENT.**

### 2.3.1 - Milliampere Input

A standard 4 to 20mA current source can be applied between terminals 1(+) and 3(-) in case of input 1, and between terminals 4(+) and 6(-) in case of input 2; such current can originate from an externally powered Transmitter. In the event that the internal controller 24V voltage source is used to power a 2-wire Transmitter the current is received only on terminal 1(+) in case of input 1 and received only on terminal 4(+) in case of input 2. Figure 4 illustrates those two connection possibilities.



Note 1: Keep shielded wire disconnected at this end.

Note 2: Connect shield wire to transmitter earth ground terminal.

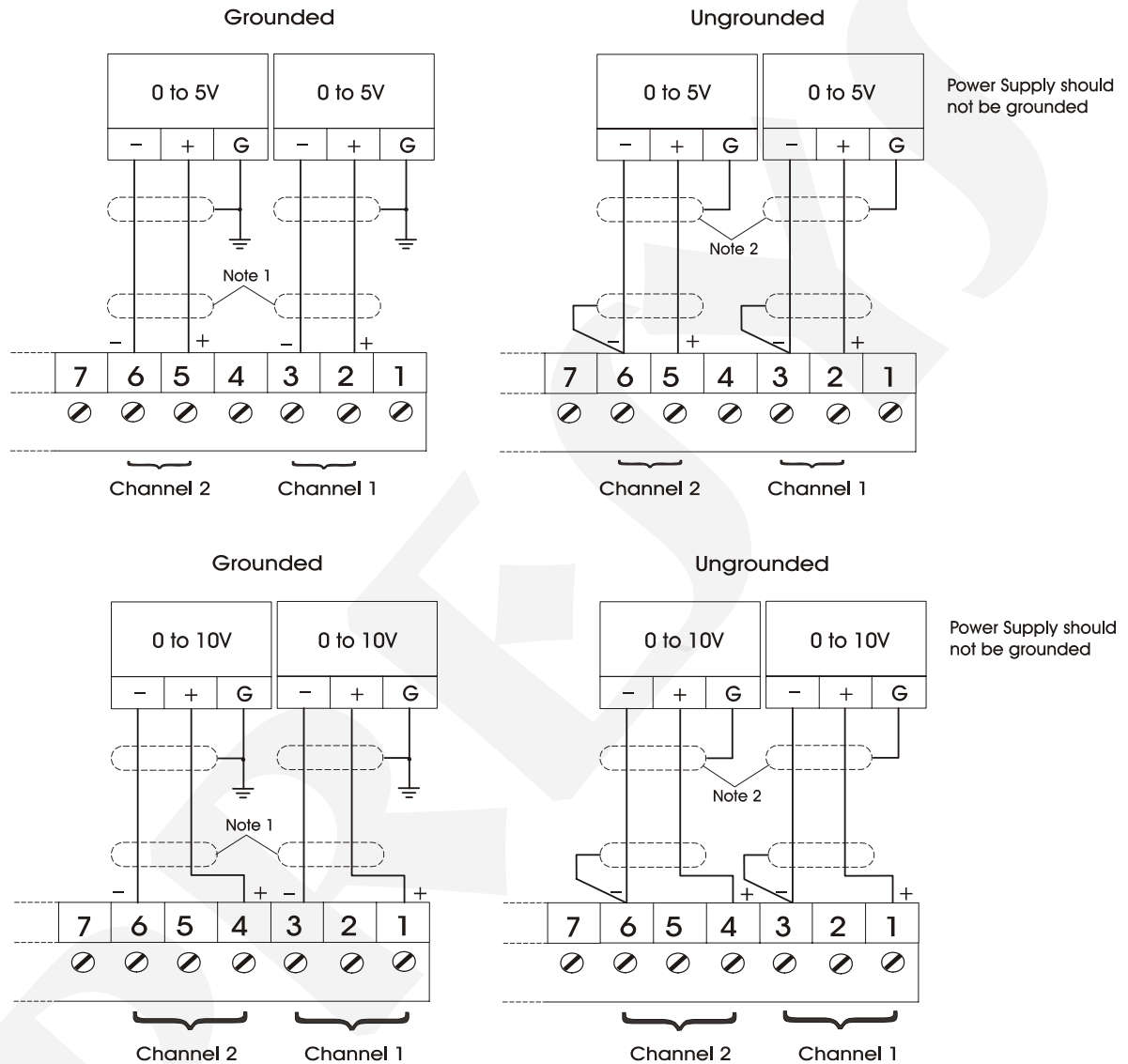
If ground terminal non-existent, keep shield wire disconnected at this end.

Fig. 4 - Current Source Connection



### 2.3.2 - Voltage Input

0 to 5VDC voltage must be applied between terminals 2(+) and 3(-) in case of input 1 and between terminals 5(+) and 6(-) in case of input 2. 0 to 10VDC voltage must be applied between terminals 1(+) and 3(-) in case of input 1 and between terminals 4(+) and 6(-) in case of input 2. Those connections are illustrated in figure 5.



Note 1: Keep shield wire disconnected at this end.

Note 2: Connect shield wire to power supply earth ground terminal.

If ground terminal non-existent, keep shield wire disconnected at this end.

Fig. 5 - Voltage Source Connection

## 2.4 - Output Signal Connection

In their most complete versions (dual loop) the Stations can be provided with up to two output signals: output 1 and output 2. Output 1 is used both in the dual loop and single loop Stations. Output 2 is used only in the dual loop instrument depending on the Station software configuration established by the user.

Outputs 1 and 2 provide three different types of analogic signal at the I/O terminals: current (4 to 20mA), voltage (0 to 5VDC) and voltage (0 to 10VDC).

Note that the I/O terminals will only show output signals if the corresponding optional module is installed and the output is correctly configured. Refer to sections 3.2 on Configuration and 4.3 on Optional Module Connection for further details on installation and configuration of optional modules.

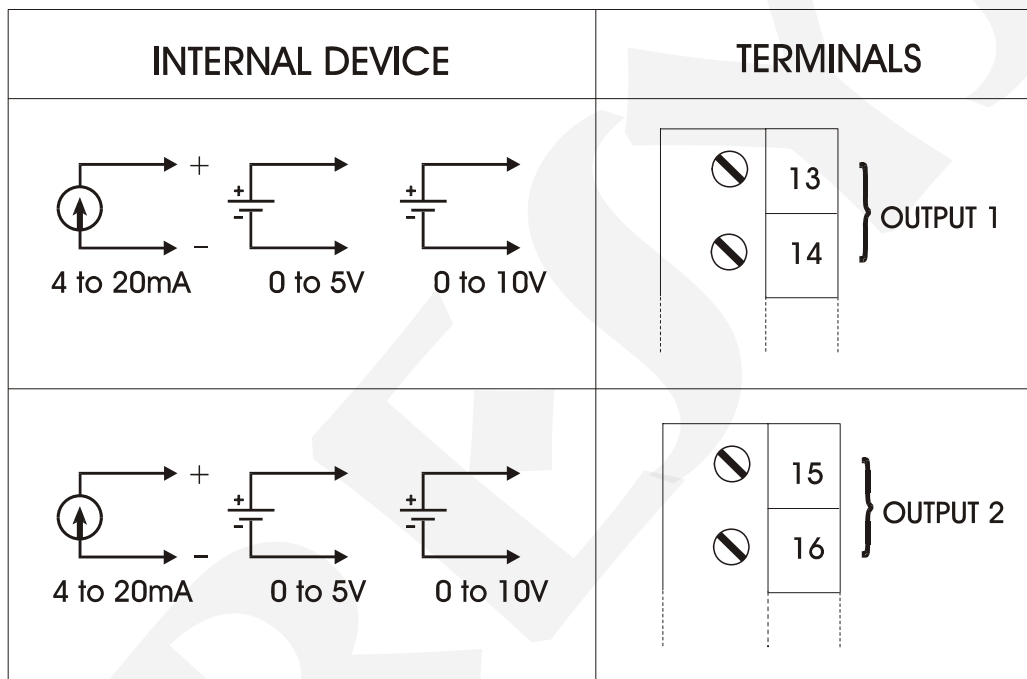
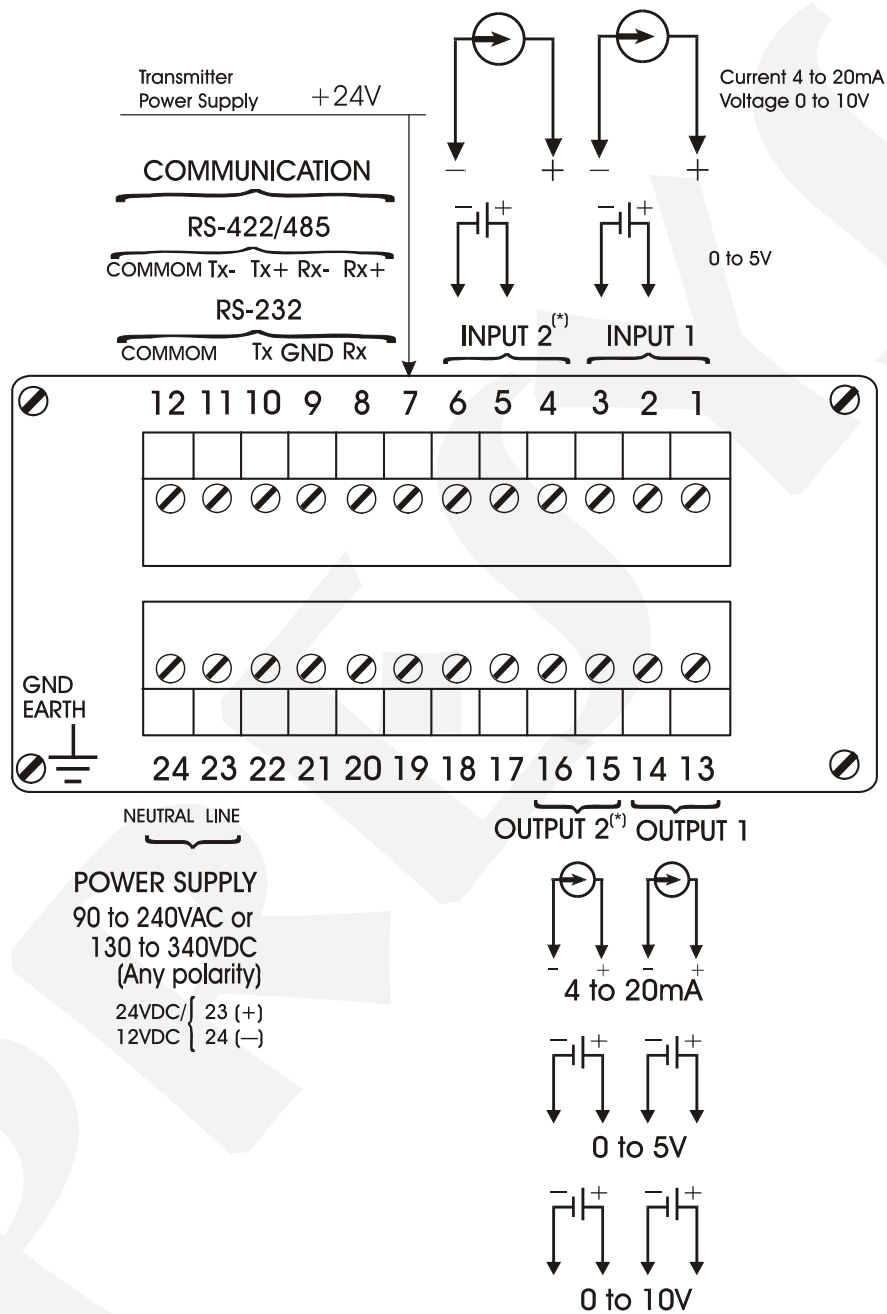


Fig. 6 - Output Connections

## 2.5 - Connection Diagram



(\* ) Only for dual station

## 2.6 - Communication

The DCY-2058 and 2059 Stations can communicate with computers via RS-232 or RS-422/485 since the communication optional module is installed and the communication parameters are configured.

## 2.7 - Engineering Units

A label containing a selection of Engineering Units is supplied with each Station. Select the one corresponding to the variable shown on the display and stick it on the front panel of the Station.

PRESYS

## 3.0 - Operation

### 3.1 - Normal Operation

The DCY-2058 and 2059 Auto-Manual / Auto / Manual Stations are provided with two operational modes: normal operation mode and configuration mode.

In normal operation mode we can further have the automatic operation mode and the manual operation mode, depending on the configuration of the Station. See section 3.2.1 on General Level configuration.

In the automatic operation mode, the Station receives the input signal which is retransmitted to the output. See section 3.2.3 on Output configuration.

In the manual operation mode, the user himself determines the output by using the UP and DOWN keys to increase or decrease the analogic output value.

The selection between the automatic and manual modes is made through the automatic/manual (A/M) key on the front panel of the DCY-2058 and 2059 Stations. When in manual mode the green LED indicating the manual state is illuminated. The Manual Station maintains the green led on and the A/M key has no function. The Automatic Station maintains the green led off. The A/M key has no function too.

The normal operation mode of the stations, in which they operate most of the time, will be named level zero. In this level the upper display can show the following messages:

- 'OUT1' in single loop Stations,
- 'OUT1' or 'OUT2' according to the loop selected in dual loop Stations, and
- 'CONF'.

The lower display shows the value of the selected analogic output (V\_OUT 1 or V\_OUT 2), given in engineering unit.

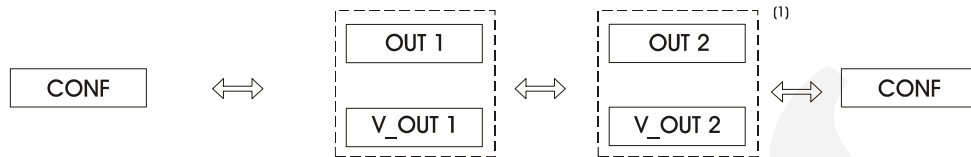
When the input is enabled, the upper display shows the value of the input signal (PV.1 or PV.2) in place of OUT1 or OUT2 mnemonics.

Whenever the Stations are powered on, they display the last selection shown before they were turned off. In order to switch to other options of the operation level, use the ENTER key, as illustrated in figure 7.

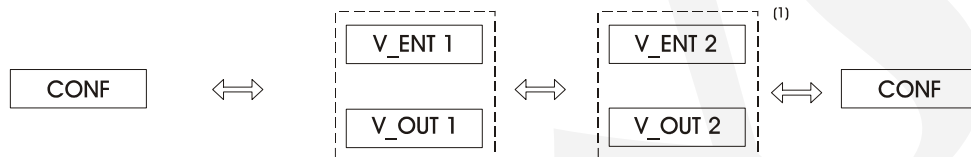
Figure 7, below, illustrates all these display presentations possibilities at the operation level for the DCY-2058 and 2059 Stations.

Operation Level

INPUT ENABLED







INPUT DISABLED




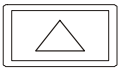
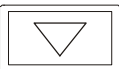

(1) Only for dual loop station.

Fig. 7 - Operation Level Options


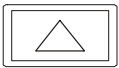
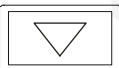

At the operation level, the keys on the Auto-Manual Station front panel have the following functions:

Tecla		Função
A/M		Switches from automatic mode to manual mode and vice-versa.
UP		Increases the output value when in manual mode and has no function in the automatic mode.
DOWN		Decreases the output value when in manual mode and has no function in the automatic mode.
ENTER		Change the options presented on the display.

The keys on the Manual Station front panel have the following functions:

Tecla		Função
A/M		No function.
UP		Increases the output value.
DOWN		Decreases the output value.
ENTER		Changes the options presented on the display.

The keys on the Automatic Station front panel have the following functions:

Tecla		Função
A/M		No function.
UP		No function.
DOWN		No function.
ENTER		Changes the options presented on the display.

In order to have access to the configuration levels described in the following sections, one should change the display to the CONF option.

### 3.2 - Configuration

The DCY-2058 and 2059 Stations can be configured with a password system to prevent unauthorized people from altering critical process parameters.

Therefore, whenever the UP key is pressed while the CONF mnemonic (Configuration) is shown on the upper display, one of the following cases may occur depending on configuration:

- i) To enter level 1 (GENERAL) of configuration mode directly, indicating that the instrument was not configured with the password system.
- ii) The display shows the password mnemonic, indicating that the instrument is provided with a password system which can be either by key or by value, as illustrated on figure 8.

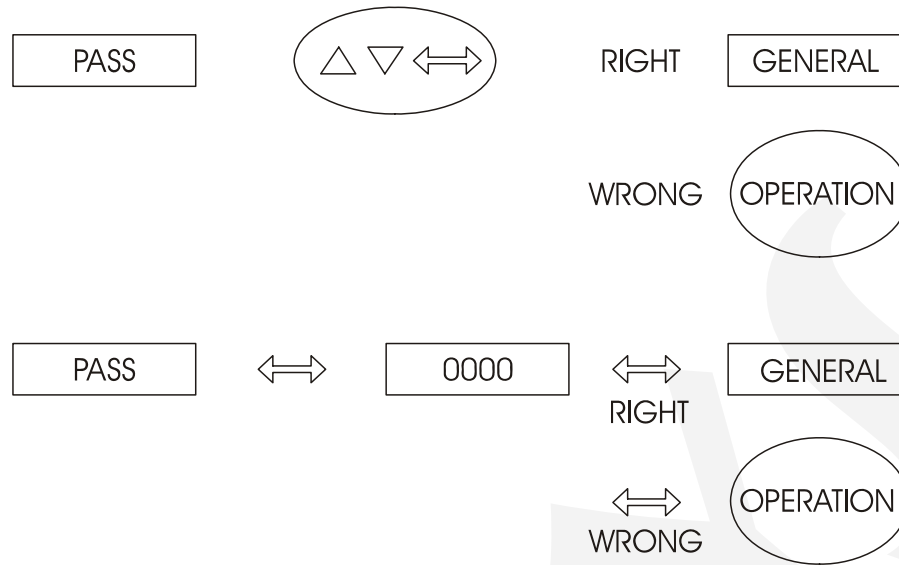


Fig. 8 - Password System by Key and by Value

In case of password by key, the user should press the UP, DOWN and ENTER keys in sequence to enter the configuration levels.

In case of password by value the user should press the ENTER key a second time to obtain the display of number 0000 with the last digit flashing on the right. The flashing digit indicates the position where the digit of a 4-digit number will be entered by the user. In order to move to the other digits to the left of the number one should press the ENTER key. After entering all digits, press once more the ENTER key to switch to level 1 in case the password is correct; otherwise, the system reverts to normal operation mode (see figure 8).

The user may even select both password systems, by key and by value. In this case, if upon receiving a request for a password the user enters a wrong key sequence he will be immediately reverted to password by value.

The password may be a number selected by the user (customized), or the number 2058 or 2059 according to the Station model. Note that in case of password by value the number 2058 or 2059 (for each Station model) is always enabled, to help the user in case one does not remember the password. In order to enter a password number or any other parameter value, use the Station front keys which have the following functions:

Key	Function
UP	Increases the digit
DOWN	Decreases the digit
ENTER	Moves to digit on the left

All configuration parameters are stored in the non-volatile memories (E2PROM and NVRAM) and determine the instrument normal operation. Through configuration parameters the user may adapt the instrument according to his requirements. Normally the DCY-2058 and 2059 Stations are factory configured and the user is not expected to enter the configuration mode. However, nothing prevents the user from reconfiguring the instrument in case a new application so requires. This is made possible in view of the



great variety of operation modes and the universal characteristics of the two inputs in the DCY-2058 and 2059 Stations.

The configuration parameters are distributed over 5 increasing hierarchical levels as shown in figure 9.

In order to go through those levels and to have access to their corresponding parameters use the instrument front keys, which have the following functions:

Key	Function
ENTER	Enters into a level
UP	Switches to a higher level
DOWN	Switches to a lower level

Note: in the following diagrams, the Station displays are represented by rectangles in response to the selection of ENTER, UP and DOWN keys.

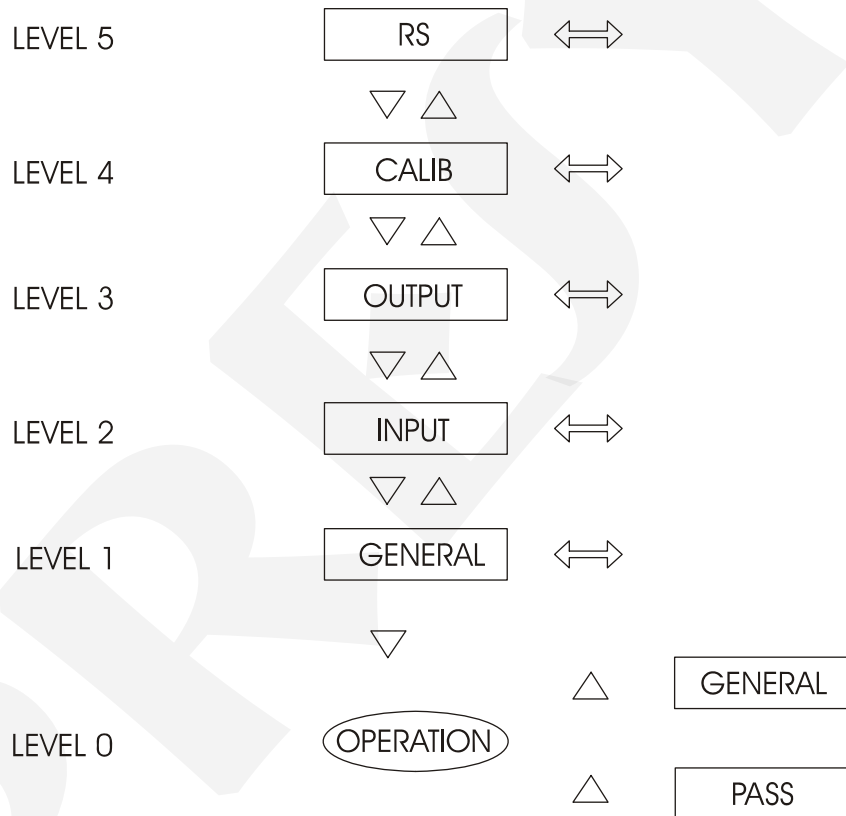


Fig. 9 - Diagram of Parameter Levels

The hierarchical levels are shown below. A step by step explanation is given for the options in each level, with all the corresponding parameters.

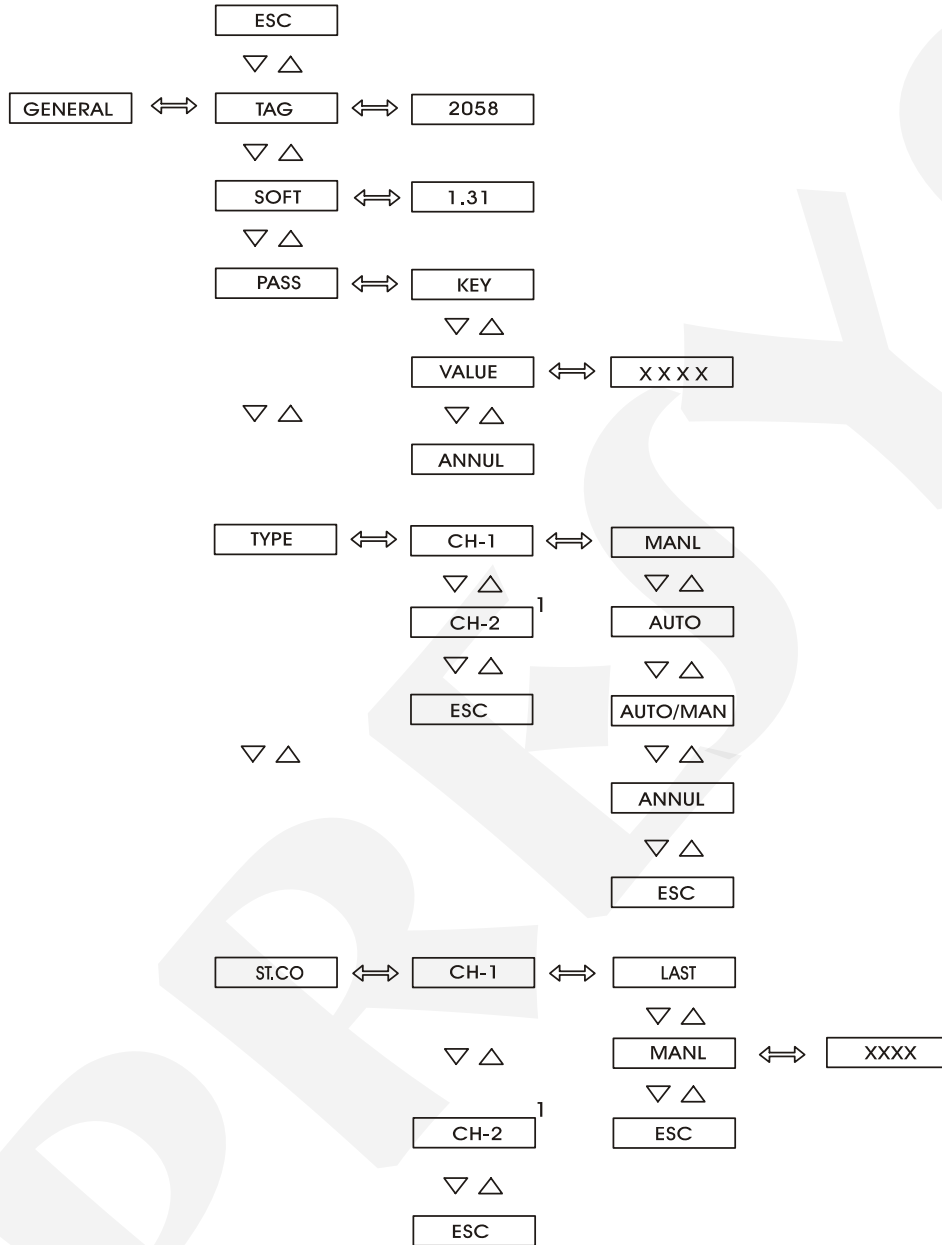
Within each level, the instrument front panel keys have the following functions:

Tecla	Função
UP	Scrolls the options in ascending order
DOWN	Scrolls the options in descending order
ENTER	Confirms or advances the options within the level whenever the display does not show ESC. When ESC is shown on the display, it goes back one or more positions

Note: When accessing any parameter of the configuration level, the Station shows the option or value corresponding to the current configuration of the parameter.

### 3.2.1 - Level 1 - General

In level 1 we have the options: TAG, SOFT, PASS, TYPE and ST.CO (see figure 10).



(1) Follows the same options of CH-1

Fig. 10 - GENERAL Level Options

TAG - this option is a numeric identification for the instrument. The procedure to enter the tag or any other parameter is the same as for the previously described password (see the functions of the ENTER, UP and DOWN keys on Configuration section).

SOFT - shows the number of the software version.

PASS - an option used for entering a password system giving access to the configuration mode. The password system may be entered by key, by value (a number selected by the user or the numbers 2058 or 2059, according to the Station model) or both. As previously explained, the sequence for entering a password by key is to press the UP, DOWN and ENTER keys, in this order.

TYPE - This option configures the channel of the instrument as a Manual, Automatic or Auto-Manual Station. The dual loop station can be configured as a single loop, provided that the undesirable channel is disabled (option ANNUL).

Note: The instrument is specified as a single or dual Station in the order code which determines the number of analogic output modules installed in the instrument at factory. The single loop Station does not have options CH-1 and CH-2 in the configuration menu as it refers always to the channel 1.

In the Manual Station, the output works only in manual mode, that is, the user himself determines the output by using the UP and DOWN keys. In the Automatic Station, the output works only in automatic mode and the output always retransmits the input signal. In the Auto-manual Station, the output works in both modes. The selection between the automatic and manual modes is made through the A/M key. The transference from the automatic mode to the manual mode is bumpless, that is, the output value remains at the same value it was prior to the transference.

Note: The instrument is adjusted at factory for the specific output module which is installed. Thus any change of the output modules – due to maintenance with component replacement, change or acquisition of new modules - requires a new adjusting process. See section 4.3 on Optional Module Connection.

ST.CO - this option allows the selection of the mode in which the Stations should return after a power failure. If the mnemonic LAST is selected for the ST.CO option, the Station will return to the same configuration it was operating prior to the power failure (manual or automatic). When the MANL option is selected for the ST.CO option, the Station will always return to the manual mode after a power failure, with the output level being determined by the MANL parameter. The MANL parameter is user adjustable.

The configuration of the instrument as an Auto-Manual Station, for instance, is established by the TYPE option. Enable the option by choosing the AUTO/MAN mnemonic after selecting the corresponding loop (or channel).

In GENERAL level, use the UP and DOWN keys until the TYPE option is reached: press ENTER, select channel 1 or 2, press ENTER again, and finally select the type desired for the station (AUTO/MAN).

The adjustable parameter ranges shown on figure 10 are given below:

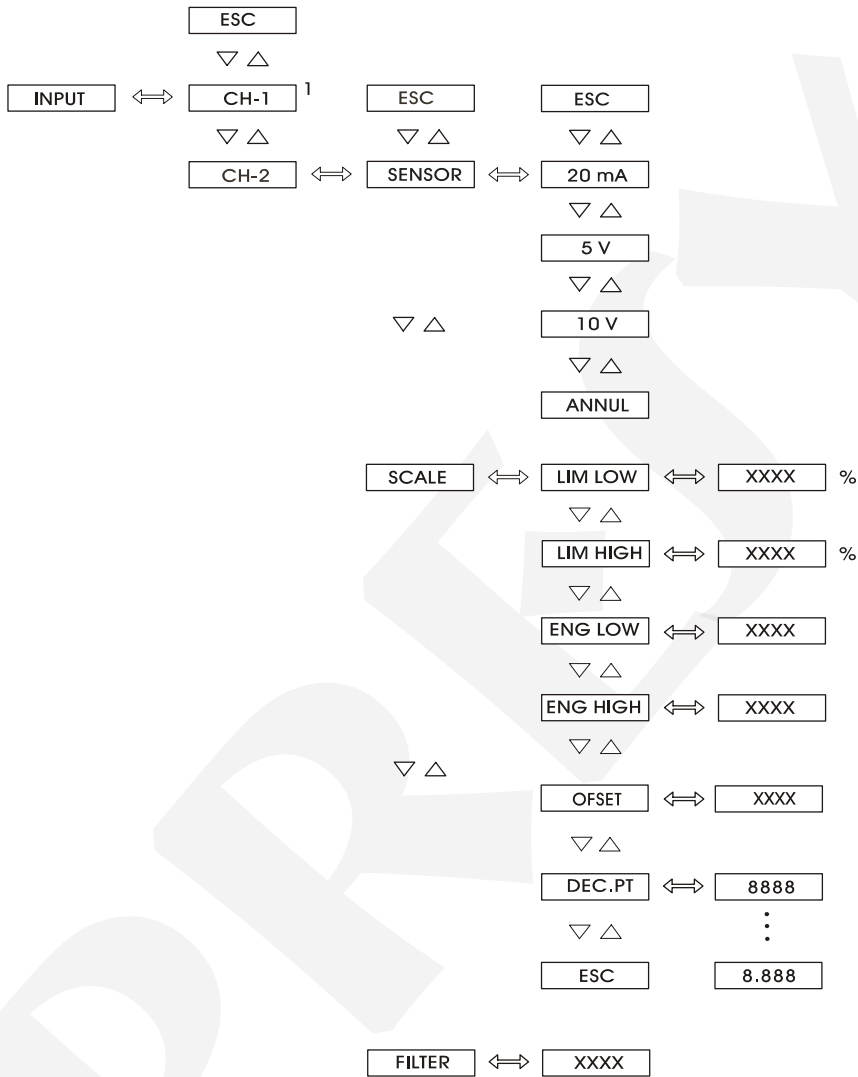
<b>Mnemonic</b>	<b>Parameter</b>	<b>Adjustable Span</b>	<b>Factory Value</b>	<b>Unit</b>
TAG	instrument identification	-999 to 9999	2058 2059	-----
SOFT	software version	-----	1.31	-----
VALUE	user password	-999 to 9999	0	-----
MANL	start-up output	0 to 100	0	%



### 3.2.2 - Level 2 - Input

The Input Level allows to select the sensor type for each channel. The sensor types available are the linear inputs (0 to 5V, 0 to 10V, 0 to 20 mA) as illustrated in figure 11.

4 to 20mA input belongs to the 20mA option.  
 1 to 5VDC input belongs to the 5VDC option.



(1) FOLLOWS THE SAME OPTIONS OF CH-2

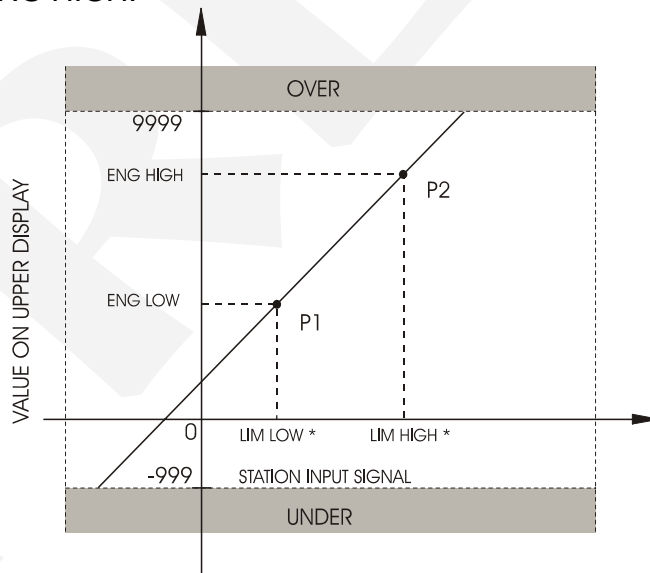
Fig. 11 - INPUT Level Options

The range of the adjustable parameters shown on figure 11 is given below.

Mnemonic	Parameter	Adjustable	Factory Value	Unit
LIM LOW	percentage of the input full scale (20mA, 5V or 10V), associated to ENG LOW	0.0 to 100.0	0.0	%
LIM HIGH	percentage of the input full scale (20mA, 5V or 10V), associated to ENG HIGH	0.0 to 100.0	100.0	%
ENG LOW	display indication associated to LIM LOW	-999 to 9999	0.0	EU*
ENG HIGH	display indication associated to LIM HIGH	-999 to 9999	100.0	EU
OFFSET	constant added to display indication	-999 to 9999	0	EU
FILTER	time constant of first order digital filter	0.0 to 25.0	0.0	second

(\*) EU - Engineering Unit

The scale is configured (SCALE option) using, two points P1 (LIM LOW, ENG LOW) and P2 (LIM HIGH, ENG HIGH), according to figure 12. LIM LOW represents the value of the electrical signal, in %, associated to the display indication ENG LOW, and LIM HIGH corresponds to the value of the electrical signal, in %, associated to the display indication ENG HIGH.



(\*) % OF FULL SCALE OF INPUT SIGNAL

Fig. 12 - Linear Input Configuration

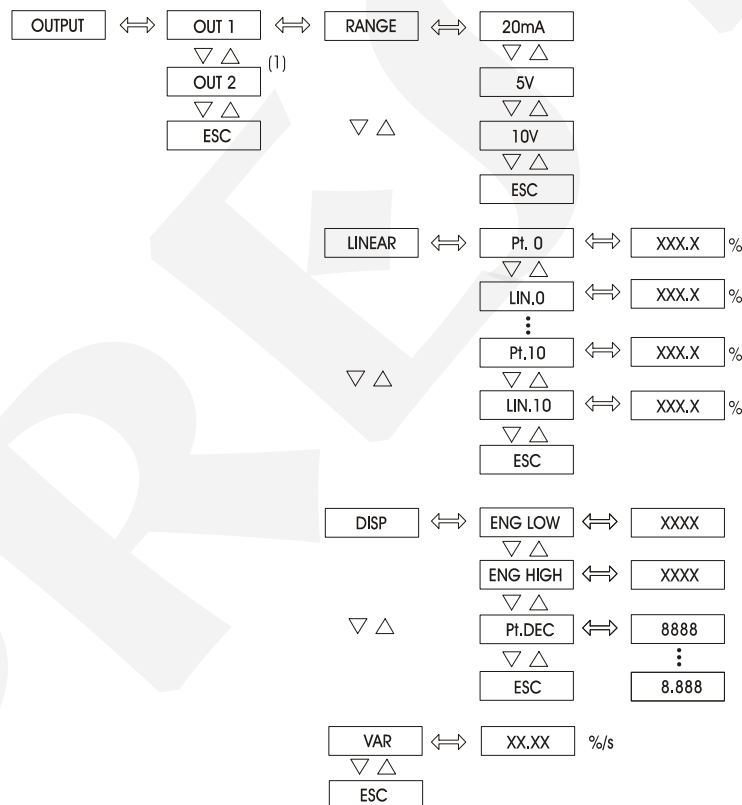
DEC.PT - sets the decimal point to exhibit the engineering units on the upper display. It can be configured up to three decimal digits.

OFFSET - it allows the user to enter a fixed offset value (in engineering units) to be added to the value shown on the upper display. This is a useful option whenever we have more than one instrument controlling the same process variable and showing slightly different readings. The OFFSET parameter may be used to equalize instrument measurements.

FILTER - this parameter provides the time constant for a first order digital filter associated with the selected input. Whenever no filtering of the input signal is desired, zero should be assigned to this parameter.

### 3.2.3 - Level 3 - Output

Level 3 allows the output types to be configured in accordance to the module internally installed in the Stations (see figure 13). Three types of output are available for outputs 1 and 2: current (4 to 20mA), voltage (1 to 5V) and voltage (0 to 10V).



(1) FOLLOWS THE SAME OPTIONS OF OUT 1

Fig. 13 - OUTPUT Level Options



The adjustable parameter span shown on figure 13 is given below.

Mnemonic	Parameter	Adjustable Span	Factory Value	Unit
PT. 0, PT. 1, PT. 2, . . . PT. 10	Percentage of output indication span used for output signal linearization.	0.0 to 100.0	0.0, 100.0, 0.0, . . . 0.0	%
LIN. 0, LIN. 1, LIN. 2, . . . LIN. 10	Percentage of output signal full scale (20mA, 5V or 10V), related to the percentage of the output indication span.	0.0 to 105.0	20.0 100.0 0.0 . . . 0.0	%
ENG LOW	Output indication that corresponds to the mnemonic ENG. LOW of the INPUT level.	-999 to 9999	0.0	EU <sup>(*)</sup>
ENG HIGH	Output indication that corresponds to the mnemonic ENG. HIGH of the INPUT level.	-999 to 9999	100.0	EU
VAR	Slew rate of the output signal.	0.00 to 99.99	0.00	%/s

(\*) EU - Engineering Unit

The output 1 and 2 indication can be configured in engineering unit by using the mnemonics ENG. LOW and ENG. HIGH of DISP option. ENG. LOW and ENG. HIGH are associated to the mnemonics ENG. LOW and ENG. HIGH of the INPUT level, respectively.

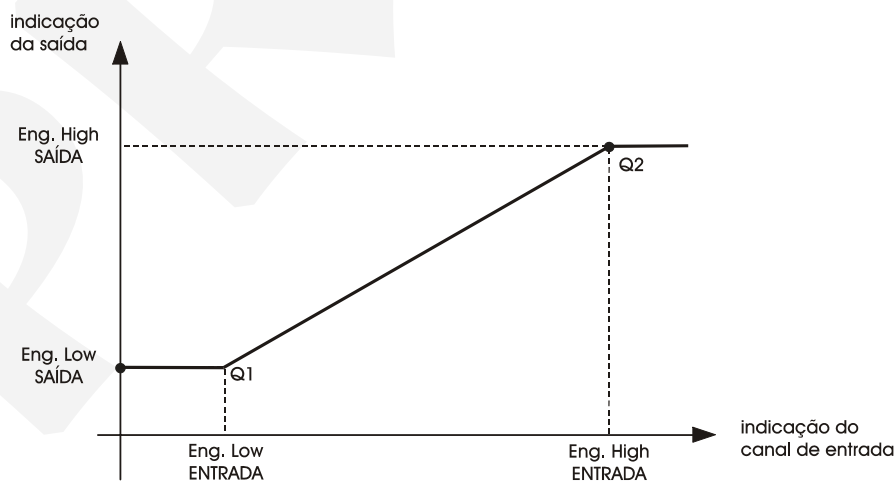


Fig. 14 – Configuration of the Output Engineering Unit

The output signal can be linearized configuring the LINEAR option. See the graphic below:

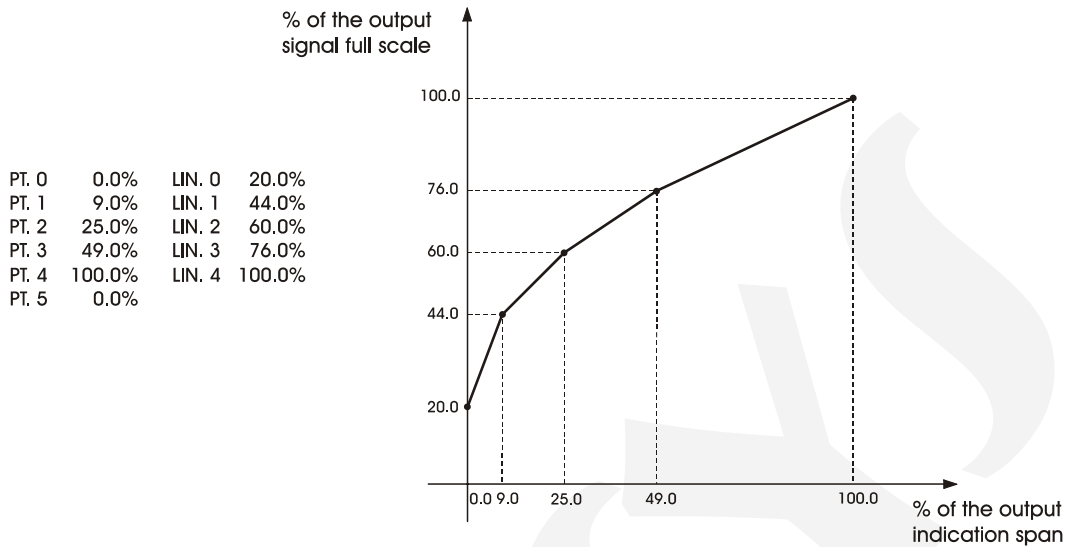


Fig. 15 - Linearization of the Output Signal

The parameters LIN. 0 to LIN. 10 corresponds to the percentage of the output signal full scale. These parameters are associated to the output indication by means of the parameters PT. 0 to PT. 10.

Parameters PT. 0 to PT. 10 should be configured as percentage of the output indication span.

Note: it is not necessary to set all the 11 parameters. The parameters considered for linearization are the first (PT. X, LIN. X) points whose parameters PT. X are in ascending order. Therefore, in a linearization of 5 points, one should configure PT. 0 to PT. 4 and LIN. 0 to LIN. 4, besides setting parameter PT. 5 to 0.0% to break the ascending order.

VAR – this parameter prevents the output signal from changing abruptly. It determines the maximum rate that the signal can vary. When configured to 0.00%/s, it is disabled and the output signal variation is no more restricted.

As an example of output configuration, suppose one dealing with a normally opened valve, i.e., 4mA maintains the valve opened. Thus, the indication of 100% on the display should refer to the maximum flow through the valve, which corresponds to the instrument 4mA output. In this case, enter the following parameters in the OUTPUT level.

PT. 0	0.0%
LIN. 0	100.0%
PT. 1	100.0%
LIN. 1	20.0%
PT. 2	0.0%
ENG HIGH	0.0
ENG LOW	100.0
PT. DEC	888.8

The output inverse indication is common when dealing with a normally opened valve, i.e., 4mA maintains the valve opened. Thus, the 100% indication on the display refers to the maximum flow through the valve which corresponds to the instrument 4 mA output.

### **3.2.4 - Level 4 - Calibration**

Level 4 is described on section 4.4 on Calibration.

### **3.2.5 - Level 5 - RS**

Refer to the communication manual.

PRESYS

## 4.0 - Maintenance

### 4.1 - Station Hardware

The Station maintenance requires the user to have access to the instrument hardware. The Station hardware is divided into three main circuit boards: the Display Board, the CPU Board and the Power Supply Board. The three circuit boards are attached to the aluminum case by only one screw located at the front panel. Loosen this screw and pull the Station front panel to remove the instrument from its case.

The Display Board is located on the Station front panel. The front panel is provided with four internal retaining brackets located on the four corners which keep the CPU Board and the Power Supply Board attached together. A spacer is screwed between the CPU Board and the Power Supply Board to confer the set a higher rigidity. To open the set follow the instructions below:

- i) Remove the screw attaching the spacer located on the rear part of the circuit boards.
- ii) Loose only the retaining bracket located on the power supply board, opposite to the flat-cable that joins the power supply and CPU boards.
- iii) Disengage the upper circuit board toward the right and open the circuit boards as shown on figure 16.

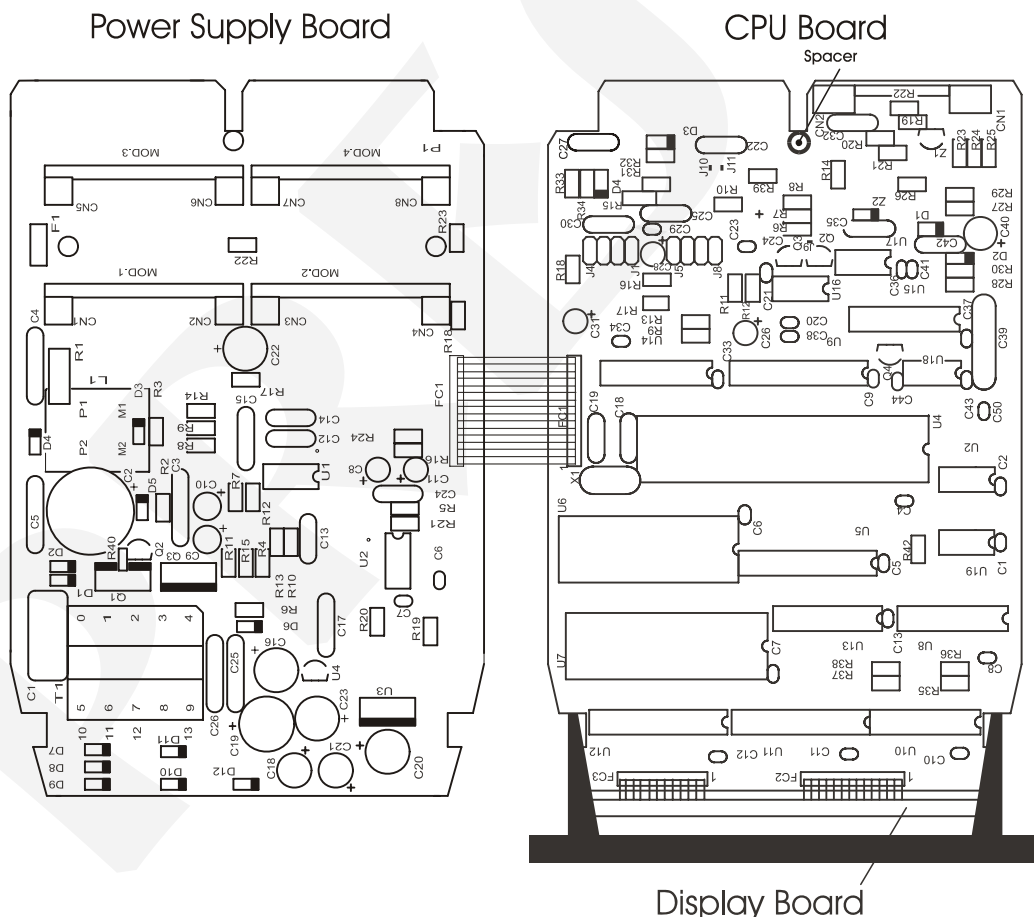


Fig. 16 - Instrument Hardware

### 4.2 - Hardware Configuration

The input level software configuration (level 2 - INPUT) must be complemented by the input configuration by hardware using internal jumpers.

There are four places for the installation of jumpers for channel 1: J5, J6, J7 and J8; and also four places for the installation of jumpers for channel 2: J1, J2, J3 and J4. They are located on the CPU Circuit Board as illustrated on figure 17.

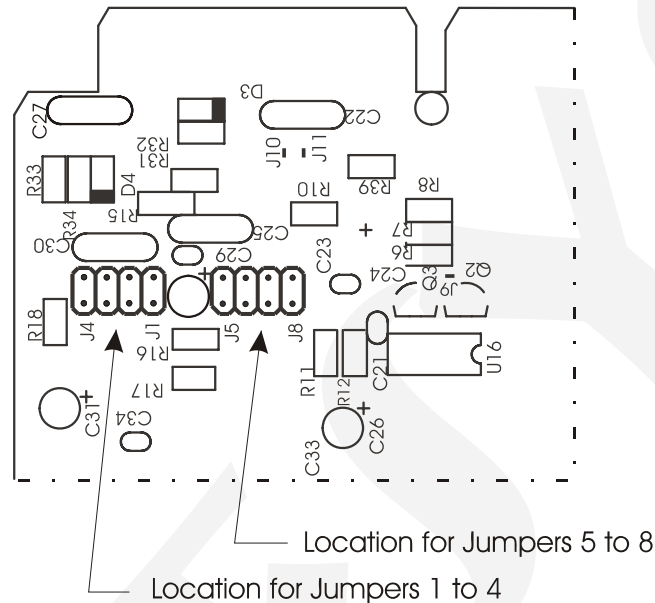


Fig. 17 - Location of Jumpers on the CPU Board

Table 2 indicates the jumpers to be installed for the various types of inputs. Check the required type of input and locate the jumpers as specified. Make sure only those jumpers corresponding to the required input are installed.

Input Type	Jumpers						
	Channel 2				Channel 1		
Voltage (0 to 5V)	J1			J4	J5		J7
Voltage (0 to 10V)*			J3			J6	
Current (0 to 20mA)			J3	J4		J6	J7

Table 2 - Configuration jumpers per type of input

(\*) In case of input for voltage from 0 to 10V, the second supplied jumper should be stored out of the instrument or connected to just one of the connector pins, in a dummy position as illustrated on figure 18.

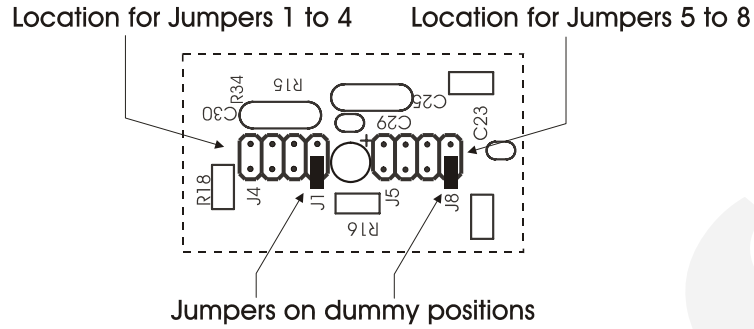


Fig. 18 - Jumpers on dummy positions for 0 to 10V input

### 4.3 - Optional Module Connection

The DCY-2058 and 2059 Stations may be provided with up to two output plus communication. For that purpose, the corresponding optional modules should be installed inside the instrument. By opening the Stations as explained in section 4.1, one has access to 4 plug-in connections on the Power Supply Board, plus one plug-in connection on the CPU Board (see figure 19).

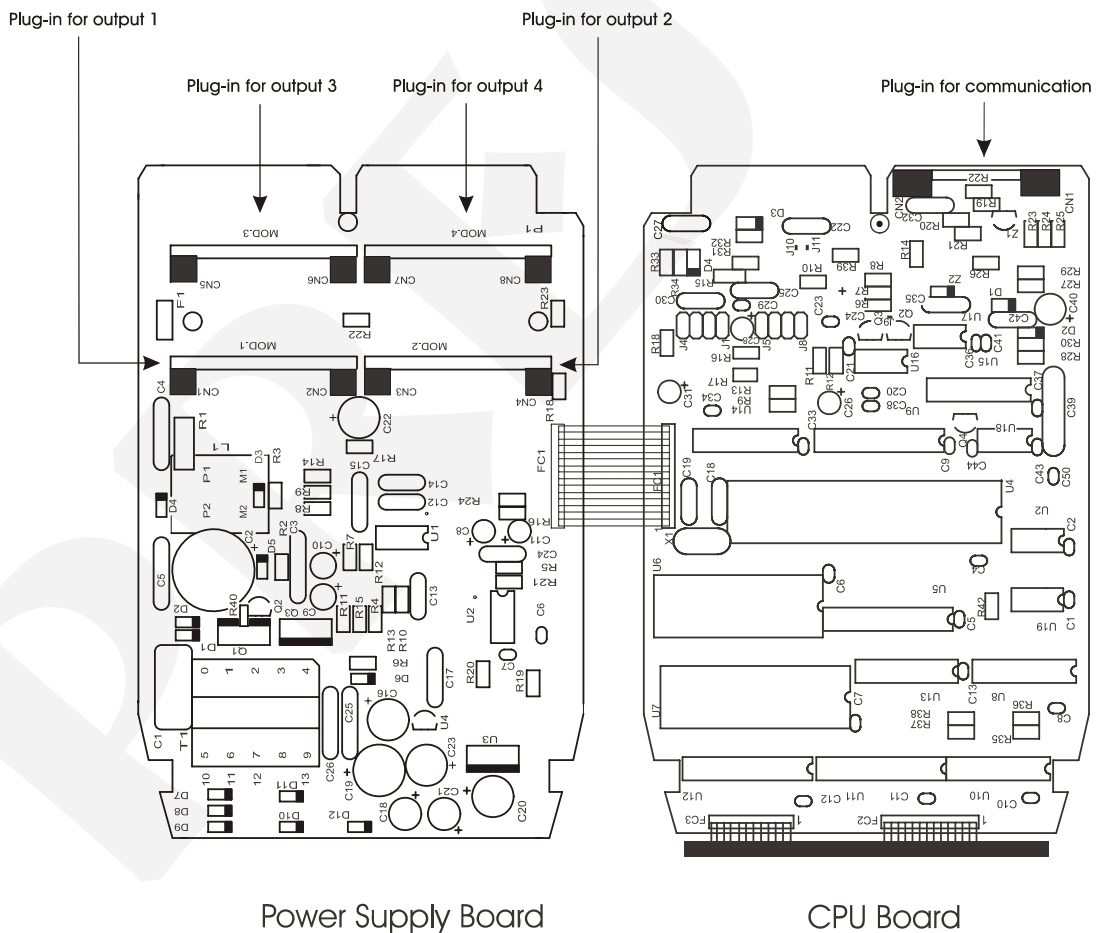


Fig. 19 - Module Connections

The plug-in connections on the Power Supply Board are called MOD 1, MOD 2, MOD 3 and MOD 4. MOD 1 and MOD 2 are connected, respectively, to the modules corresponding to output 1 and output 2. MOD 3 and MOD 4 have no use in DCY-2058 / 2059 and must be kept unconnected.

The plug-in connection for the communication module is located on the CPU Board and has no denomination. Any module should always be installed with the component side facing the instrument display, as illustrated on figure 20.

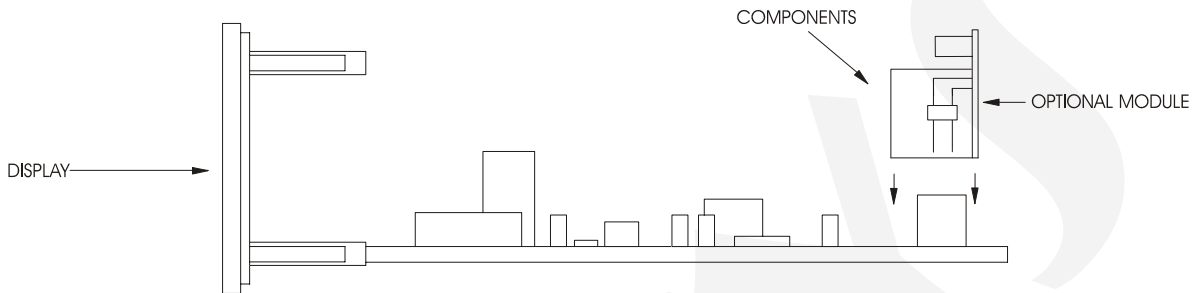


Fig. 20 - Module Installation

Outputs 1 and 2 as analog outputs (optional module code: MSAN-20)

Output 1 module is plugged in the connector called MOD 1. In case an additional analog output is required, a second module is plugged in the connection called MOD 2.

The analog output optional module is provided with two locations for the installation of jumpers: J1 and J2, as illustrated on figure 21.

Location for jumpers 1 and 2

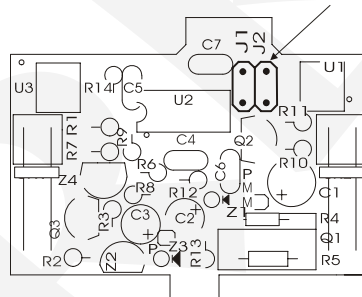


Fig. 21 - Jumper locations on the Analog Output Board

To configure the analog output module as a 4 to 20mA, 1 to 5V or 0 to 10V output just install the jumper as specified on table 3.

Analog output type	Jumpers	
4 to 20mA*		
1 to 5V	J1	
0 to 10V		J2

(\*) In case of the analog output for 4 to 20mA current, the supplied jumper should be stored out of the instrument or connected to just one of the connector pins, in a dummy position, similar to that illustrated on figure 18.

Table 3 - Analog Type Output Jumper Configuration

## 4.4 - Calibration

**WARNING: Only enter the following options after completely understand them. Otherwise it might be necessary to send the instrument back to factory for recalibration. Calibration in this manual means adjustment.**

The DCY-2058 and 2059 Stations are accurately calibrated at factory and will not require periodic recalibration under normal conditions. If, for any reason, a recalibration is required, follow the procedure described below.

Disconnect the process signals from the Station I/O terminals.

Prior to carrying out the calibration allow the instrument to warm up for at least 30 minutes to ensure that it reaches stable operating conditions.

This section contains basically two parts: input calibration and output calibration.

### Input calibration

The input calibration describes the procedure to be followed when calibrating input 1 (for single or dual loop Stations) and input 2 (only for dual loop Stations).

The accuracy and precision of the reference generating calibration equipment should be, at least twice as good as the Station specifications.

References on the following tables relate to the input type to be calibrated. The column on the right on these tables shows the mnemonics displayed in the calibration process.

Always check that the internal jumper configuration correctly matches the input type to be calibrated.

Prior to carrying out the calibration procedure, access Calibration level 4. The calibration level is provided with a password system which prevents the inadvertent access to this level and the likelihood of damaging the Stations calibration parameters.

**The access password to this calibration level is number 5.**

Once the calibration password is provided, select the input type to be calibrated within the INPUT option. Select the channel to be calibrated by pressing ENTER. The display will show the mnemonics corresponding to the references required by the calibration process. Those references should be entered prior to the display of the corresponding mnemonic and the calibration procedure is started by pressing ENTER. At this time the Station starts the calibration procedure and the display will flash the mnemonic CAL.

While the display is flashing, the reference should remain connected to the input channel to be calibrated.

When the display stops flashing and the corresponding mnemonic is back on screen, the calibration process for the first point will have ended.

Change to the next reference and press the DOWN key to select the next point. Allow at least 1 minute between any two calibration points. After this time is elapsed, press ENTER to start calibration of the second point.

After running through the two references on the table relative to the input type to be calibrated, the calibration process will have been completed.

In the event that the calibration of any particular point has not been properly carried out, there is always the possibility of having that particular point recalibrated without damaging the calibration of any other already calibrated points.



In order to return to normal operation move back through the hierarchical levels until reaching level zero.

Figure 22 shows the input and output calibration options for calibration level 4.

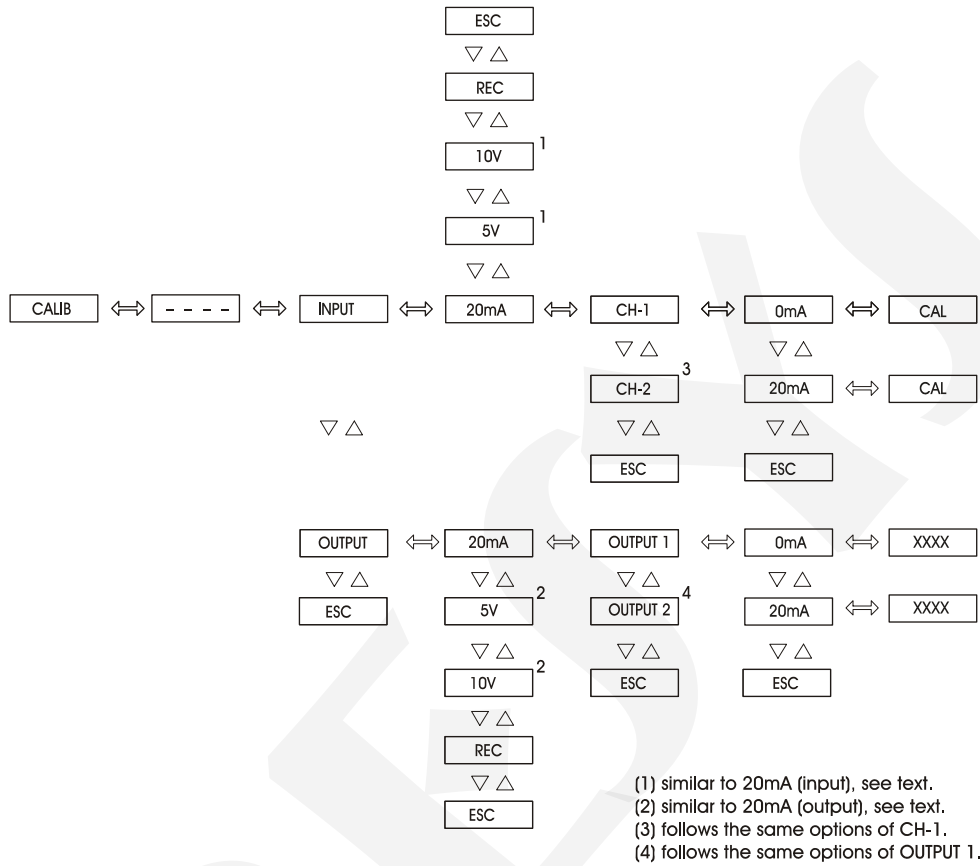


Fig. 22 – CALIBRATION Level Options

Calibration of voltage input (0 to 5V)

In order to calibrate the voltage input (0 to 5V) connect an accurate DC voltage source to the channel to be calibrated (terminals 2(+) and 3(-) for channel 1 or 5(+) and 6(-) for channel 2). The two voltage references listed on table 4 will be required.

Reference	Mnemonic
0.0000V	0V
5.0000V	5V

Table 4 - Required voltages for the calibration of voltage inputs from 0 to 5V

Calibration of voltage input (0 to 10V)

In order to calibrate the voltage input (0 to 10V) connect an accurate DC voltage source to the channel to be calibrated (terminals 1(+) and 3(-) for channel 1 or 4(+) and 6(-) for channel 2). The two voltage references listed on table 5 will be required.

Reference	Mnemonic
0.0000V	0V
10.0000V	10V

Table 5 - Required voltages for the calibration of voltage inputs from 0 to 10V

Calibration of current input (0 to 20mA)

In order to calibrate the current input (0 to 20mA) connect an accurate DC current source to the channel to be calibrated (terminals 1(+) and 3(-) for channel 1 or 4(+) and 6(-) for channel 2). The two current references listed on table 6 will be required.

Reference	Mnemonic
0.000 mA	0mA
20.000 mA	20mA

Table 6 - Required current for the calibration of current inputs from 0 to 20mA

Output calibration

Analog outputs can be calibrated by the Stations themselves.

Output 1 can be calibrated by input 1 and output 2 can be calibrated by input 2.

The configuration of input hardware should be the same as for the output (0 to 5V, 0 to 10V or 0 to 20mA) since the Stations themselves will be measuring the output signal. Therefore, check that the configuration of the internal jumpers in the Output Module Board and the CPU Board match the corresponding input and output types.

Make sure the input type to be used for the output calibration has already been properly calibrated.

Make the connections listed in table 7 according to the output module and output signal should be calibrated.

<b>Output type</b>	<b>Output 1 with Input 1</b>	<b>Output 2 with Input 2</b>
current (0 to 20mA) voltage (0 to 10V)	terminal 13 (+) with 1 (+) terminal 14 (-) with 3 (-)	terminal 15 (+) with 4 (+) terminal 16 (-) with 6 (-)
voltage(0 to 5V)	terminal 13 (+) with 2 (+) terminal 14 (-) with 3 (-)	terminal 15 (+) with 5 (+) terminal 16 (-) with 6 (-)

Table 7 - I/O terminal connections for output calibration

Now enter level 4 and select which of the two outputs will be calibrated. Select the output signal (0 to 20mA, 0 to 5V or 0 to 10V) and press ENTER.

The display will show the mnemonic corresponding to the first calibration point. There are two points of calibration.

In case of current output the mnemonics correspond to electrical signals from 0 to 20mA. In case of voltage the mnemonics correspond to signals from 0 to 5V or from 0 to 10V.

By pressing ENTER when the mnemonic corresponding to the first or second calibration point is displayed, the display will show the output value. It will then be possible to have the output value adjusted to the electrical level indicated by the mnemonics with the help of the UP and DOWN keys. Press ENTER after adjusting. When calibrating the first point (0mA, 0V) care should be taken to avoid output signal saturation.

Return to normal operating level by moving back until level zero.

### Returning to factory calibration

The Stations store the factory calibration parameters in the non-volatile memory which can be retrieved at any time.

Should there be any suspicion that some instrument malfunction might be due to an improper recalibration procedure use the REC option (see figure 22).

REC - this is the option allowing the retrieval of factory calibration values. This option is valid for both the inputs and outputs.

Enter level 4 and select whether to retrieve input or output values. Select the option REC and press ENTER to reload factory values.

## **4.5 - Hardware Maintenance Instructions**

Prior to returning the instrument to factory check the following possible causes of instrument malfunction.

### Instrument showing display errors

After the instrument is turned on, it starts the test routine to check the RAM and E2PROM integrity.

Should any of these components have problems the display will show the following error codes:

Err. 1 - RAM error

Err. 2 - E2PROM error

In case of a RAM error, turn the instrument off and then turn it on again to check whether the error message persists. If affirmative, return the instrument to factory.

In case of an E2PROM error, press ENTER and reconfigure the instrument. Turn the instrument off and then turn it on again to check whether the error message persists. If affirmative, return the instrument to factory.

### Instrument display off

Check if power supply voltage is provided to terminals 23 and 24 of the Station.

Verify the integrity of fuse F1 of 2.0 A placed in the Power Supply Board as shown in figure 16. Due to its package it is necessary to check the fuse continuity in order to detect if it is broken.

### Instrument malfunction

Check that if the Station is correctly configured both in terms of software and hardware (internal jumpers).

Examine if the optional modules are connected in the right plug-in connection.

Check if the voltages on flat cable 1 as shown in figure 23 are close to values in table 8 and if they are present on the CPU Board.

Points of Flat-cable 1	Voltages
Between point 1(-) and point 2(+)	5V
Between point 9(-) and point 8(+)	8V
Between point 9(-) and point 1(+)	0V
Between point 9(-) and point 10(+)	- 8V
Between point 9(-) and point 13(+)	24V
Between point 12(-) and point 11(+)	5V

Table 8 - Inspection points of voltage on flat cable 1

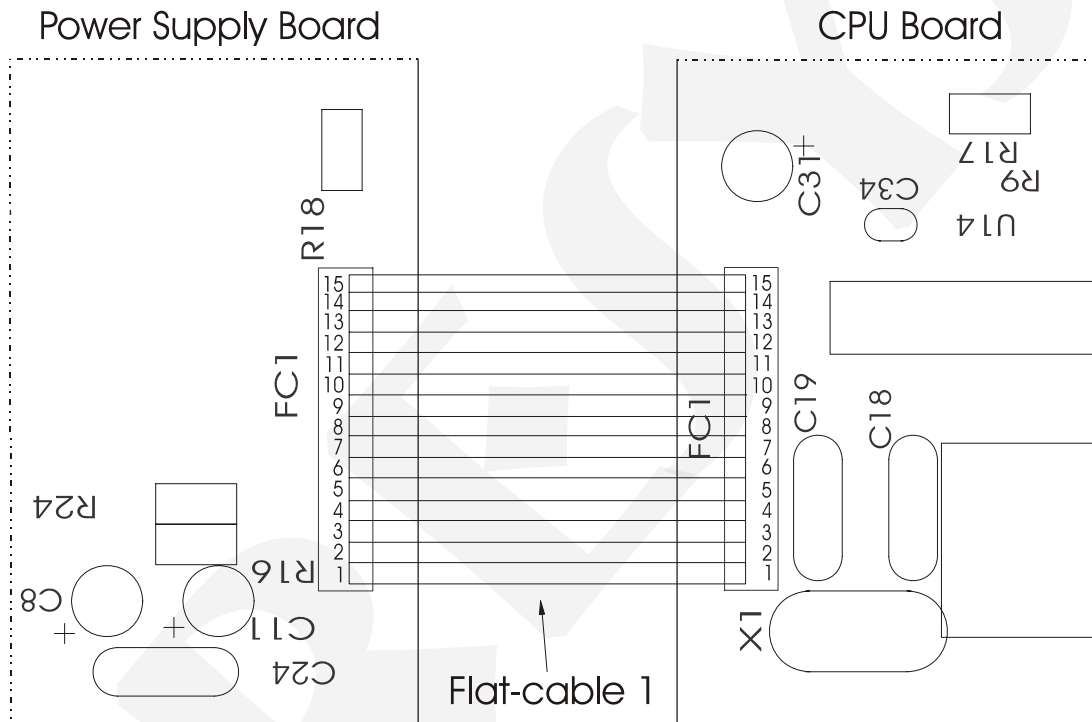


Fig. 23 - Voltage Test Points of the Station

In case the problem is not found the instrument should be returned to factory for repair.

## 4.6 - List of Components

### Display Circuit Board

Code	Components	Reference
01.05.0051-20	Display Board - DCY 2058	-----
01.05.0054-20	Display Board - DCY 2059	-----
01.07.0003-21	Display 9 mm	-----
01.07.0002-21	Display 14 mm	-----
01.04.0001-21	Diode 1N4002	D1,2
01.07.0004-21	Led 3mm (Green)	D3
01.07.0005-21	Led 3mm (Red)	D4,5
01.09.0013-21	Transistor BC 327-25	Q1,2,3,4,5,6,7,8
01.02.0074-21	Resistor 470 R	R5
01.15.0003-21	Key	CH1,2,3,4

### Power Supply Board

Code	Components	Reference
01.05.0046-20	Power Supply Board	-----
01.01.0029-21	LM 2904CT - 5.0 V	U3
01.01.0003-21	LM 1458	U2
01.01.0030-21	UC 3842	U1
01.09.0015-21	Transistor BC 337	Q2
01.09.0019-21	Transistor TIP 50	Q1
01.09.0020-21	IRF 822	Q3
01.02.0122-21	Fuse 2 A	F1
01.01.0028-21	78L24	U4
01.04.0007-21	Diode 1N4007	D1,2,3,4
01.04.0008-21	Diode 1N4936 \ 1N4937	D5,6,7,8,9,10,11,12
01.03.0009-21	Ceramic disk capacitor 100 pF X 100V / 50V	C12,13,14
01.03.0036-21	Multilayer ceramic capacitor 0.01uF X63V	C24
01.03.0035-21	Multilayer ceramic capacitor 0.1uF X 63 V	C6,7
01.03.0039-21	Polyester capacitor 0.1uF X 250 V	C1,3
01.03.0040-21	Polyester capacitor 0.01 uF X 100 V	C15,17
01.03.0041-21	Polyester capacitor 0.01 uF X 250 V	C4,5
01.03.0038-21	Radial electrolytic capacitor 10 uF X 16 V	C8,11
01.03.0042-21	Radial electrolytic capacitor 22 uF X 25 V	C9,10
01.03.0027-21	Radial electrolytic capacitor 100 uF X 25 V	C18,21
01.03.0043-21	Radial electrolytic capacitor 100 uF X 35 V	C16,22
01.03.0044-21	Radial electrolytic capacitor 220 uF X 10 V	C20,23
01.03.0045-21	Radial electrolytic capacitor 22 uF X 350 V	C2
01.03.0002-21	Radial electrolytic capacitor 1000 uF X 16 V	C19
01.03.0068-21	Polyester capacitor 4n7 X 400 V	C25,26
01.02.0105-21	Resistor 18R X 2W	R1
01.02.0111-21	Resistor 1R	R15
01.02.0126-21	Resistor 220R	R10
01.02.0114-21	Resistor 270R	R4
01.02.0074-21	Resistor 470R	R17,18,22,23
01.02.0075-21	Resistor 1K	R16,24
01.02.0080-21	Resistor 4K7	R8,12

Code	Components	Reference
01.02.0082-21	Resistor 10K	R5,20,21
01.02.0116-21	Resistor 18K	R7
01.02.0083-21	Resistor 20K	R11
01.02.0110-21	Resistor 27K	R14
01.02.0085-21	Resistor 47K	R3
01.02.0106-21	Resistor 150K	R9
01.02.0088-21	Resistor 470K	R2
01.02.0006-21	Resistor 20R	R6
01.02.0183-21	Resistor 2K32	R13
01.02.0108-21	Resistor 15K4	R19
01.06.0003-21	Transformer	T1
01.06.0004-21	Coil	L1
01.13.0004-21	Connector	CN1,2,3,4,5,6,7,8

**CPU Circuit Board**

Code	Components	Reference
01.05.0048-20	CPU Board	-----
01.01.0007-21	LM 311	U18
01.01.0016-21	EPROM 27C512	U7
01.01.0017-21	RAM 6516	U6
01.01.0044-21	E2PROM X24C04P	U1
01010034-21	NVRAM X24C45P	U2
01.01.0019-21	4051	U14
01.01.0020-21	TC-4053	U15
01.01.0021-21	74HC02	U13
01.01.0022-21	74HC138	U8
01.01.0023-21	74HC365	U10
01.01.0024-21	74HC373	U5,9,11,12
01.01.0045-21	80C32	U4
01.01.0026-21	AD706	U16
01.01.0027-21	AD 712	U17
01.16.0001-11	Crystal 11.0592 Mhz - 20	X1
01.09.0013-21	Transistor BC 327	Q2,3,4
01.04.0003-21	Diode 1N4148	D1,2
01.04.0005-21	Reference Diode LM336/5V	Z1
01.04.0006-21	Zener BZX 79/C6V2	Z2
01.03.0067-21	Ceramic disk capacitor 55 pF X 50 V	C18,19
01.03.0035-21	Multilayer ceramic capacitor 0.1 uF X 63 V	C1,4,5,6,7,8,9,10,11,12, C13,20,21,22,24,25,27, C29,30,32,33,34,35,36, C37,38,41,42,43,44
01.03.0039-21	Polyester capacitor 0.1 uF X 250 V	C39
01.03.0038-21	Radial electrolytic capacitor 10 uF X 16 V	C28,23,26,31
01.03.0027-21	Radial electrolytic capacitor 100uF X 25 V	C40
01.02.0103-21	Resistor 68R1	R24
01.02.0010-21	Resistor 100R	R21,29
01.02.0013-21	Resistor 249R	R32,34
01.02.0102-21	Resistor 442R	R23
01.02.0019-21	Resistor 1K	R6
01.02.0104-21	Resistor 3K32	R25

Code	Components	Reference
01.02.0030-21	Resistor 4K42	R8,9
01.02.0031-21	Resistor 4K99	R7
01.02.0036-21	Resistor 8K66	R28
01.02.0038-21	Resistor 10K	R20,39
01.02.0046-21	Resistor 40K2	R26
01.02.0075-21	Resistor 1K	R19,22,30
01.02.0078-21	Resistor 2K	R27
01.03.0038-21	Radial electrolytic capacitor 10 uF X 16 V	C17,28,23,26,31
01.02.0082-21	Resistor 10K	R10,13,15,18,35,36,37,38
01.02.0119-21	Resistor 15K	R42
01.02.0089-21	Resistor 1M	R11,12,16,17
01.02.0098-21	Resistor 10M	R31,33
01.17.0002-21	Jumper	Selected
01.17.0003-21	Pin bar 2x4	J1-J4 J5-J8
01.13.0043-21	Socket 28 pins	U7
01.13.0005-21	Connector	CN1,CN2
01.14.0011-21	Flat-Cable 12 ways	FC3
01.14.0025-21	Flat Cable 13 ways	FC2
01.14.0026-21	Flat Cable 15 ways	FC1

**I/O Terminal Board**

Code	Components	Reference
01.05.0049-20	I/O terminal board	-----
01.09.0015-21	BC 337	U1
01.13.0002-21	Terminal	CN1,2
01.13.0003-21	Connector	P1,2

**Analog Output Board**

Code	Components	Reference
01.05.0055-20	Analog output board	-----
01.01.0060-21	OP200GP	U2
01.01.0065-21	Optical coupler LTV817	U1,3
01.09.0006-21	TIP 117	Q1
01.09.0015-21	Transistor BC 337	Q2
01.09.0021-21	Transistor BF 245A	Q3
01.04.0030-21	Zener BZX 79/C3V3	Z1
01.04.0011-21	Zener BZX79/C3V9	Z3
01.04.0005-21	Reference diode LM 336 / 5.0 V	Z2,4
01.03.0042-21	Radial electrolytic capacitor 22 uF X 25 V	C1
01.03.0035-21	Multilayer ceramic capacitor 0.1 uF X 63 V	C5,6
01.03.0011-21	Multilayer ceramic capacitor 220pF X 63 V	C4,7
01.03.0050-21	Tantalum capacitor 1µF X 35V	C2,3
01.02.0008-21	Resistor 49R9 1%	R4
01.02.0010-21	Resistor 100R 1%	R5
01.02.0013-21	Resistor 249R 1%	R10,11
01.02.0115-21	Resistor 402R 1%	R13
01.02.0024-21	Resistor 2K 1%	R9
01.02.0029-21	Resistor 4K02 1%	R2



Code	Components	Reference
01.02.0038-21	Resistor 10K 1%	R3
01.02.0047-21	Resistor 49K9 1%	R7,8
01.02.0059-21	Resistor 301K 1%	R12
01.02.0069-21	Resistor 1M 1%	R6
01.02.0109-21	Resistor 3K3 5%	R14
01.02.0080-21	Resistor 4K7 5%	R1
01.17.0001-21	Pin bus 2 x 2	J1,2
01.17.0004-21	Pin bus 2 x 2	CN1,2
01.17.0002-21	Jumper	Selected
01.06.0004-21	Coil	-----

### 4.7 - List of Recommended Spare Components

#### Display Board

Display DP1, 2, 3, 4, 5, 6, 7, 8

#### Power Supply Board

IRF 822            Q3  
 UC 3842            U1  
 Fuse 2A            F1  
 LM 1458N          U2

#### I/O Terminal Board

BC 337            U1

#### Engineering Units Card

Code 02.10.0003.21

#### CPU Board

4051                                    U14  
 4053                                    U15  
 Reference diode LM-336/5V        Z1

PRESYS

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