Technical Support
Bulletin Nr. 13 – Glossary

Contents

Introduction

The scope of this bulletin is to:

- Explain how to interpret the characters displayed on 7-segment displays.
- Provide details on the languages and most common terms used in the user's manuals supplied with Eliwell electronic controllers. The sections that follow list some of the common terms used in technical documentation.

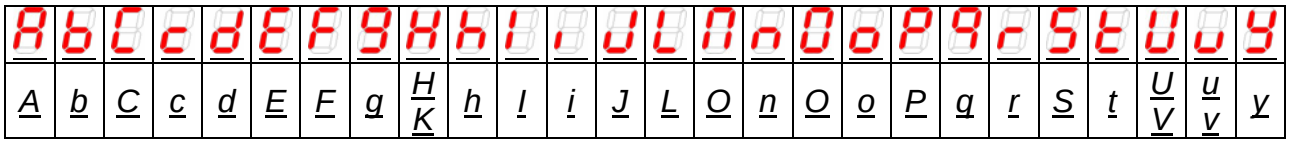
7-segment display with decimal point: interpretation of characters

Standard Eliwell instrumentation generally uses 7-segment displays with one decimal point like those shown below. The combination of several elements enable to display one (Fig. 1), two (Fig. 2), three (Fig. 3) or several digits (Fig. 4). There are also specific models with several displays combined into one "unit".

Fig.1 Fig.2 Fig.3 Fig.4

The correspondence between the display and the character is shown below:

LETTERS

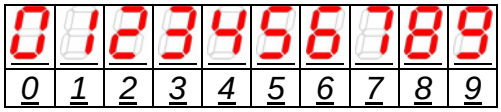


A	b	C	c	d	E	F	g	H K	h	I	i	J	L	O	n	O	o	P	q	r	S	t	U V	u v	y

NOTE: for technical reasons related to the display:

- Some letters, like X and Z, cannot be displayed
- Some letters are displayed in lower or upper case only

NUMBERS



0	1	2	3	4	5	6	7	8	9

Glossary: regulation instrumentation (temperature, humidity, pressure, etc.…)

APPLICATION: set of software rules written in a specific language that enable the software to perform specific tasks. EXTPro uses the standard languages described in standard IEC 61131-3 for the compilation of applications.

AUX: auxiliary (generally referred to a manually enabled/disabled output).

BUZZER: device that issues acoustic warnings.

LATENT HEAT: latent heat is the amount of energy per mass unit required to achieve a change of state of a substance (for example for a substance to change its state from liquid to gaseous).

SENSITIVE HEAT: sensitive heat is the amount of heat that causes the temperature of an object to increase. It is called "sensitive" because it produces a tangible effect.

CHANGE-OVER: change of mode.

REMOVABLE/EXTRACTABLE/DISCONNECTABLE CONNECTOR: type of connection constituted by a fixed part fitted on the regulator and a mobile one that can be connected/disconnected to/from the fixed part, which is in turn wired to the line supplying the load.

DEFROST: defrost.

DIFFERENTIAL/HYSTERESIS: the hysteresis value is always expressed in the unit of measure used for the set point and represents the difference between the set point value that disables the load and the value that enables it. In the specific example of a refrigerator: if the temperature value is equivalent to the set point, the compressor switches off; if it is equivalent to the set point value added to hysteresis, the compressor is restarted. This is done to reset the temperature, which changes due to thermal dissipation, to the optimal value specified by the user. In the example examined, the hysteresis is asymmetrical because it is integrally added (or subtracted) to/from the set point value. It is however possible to have a symmetrical hysteresis that overlaps the set point value.

DIGIT: number or index.

DISPLAY: LED or LCD device used to display units or values processed by the controller.

ECONOMY: this term usually refers to a function that saves energy when enabled. An economy-set or reduced-set is a set point that differs from the one normally used and that enables to save energy.

EEprom (e2): EEPROM is the acronym of Electrically Erasable and Programmable ROM and represents the ROM memory. However, unlike standard ROM memories, it can be deleted and rewritten by applying appropriate voltage and current values to its MOSFETs (the basic components of a ROM). EEPROMs use the tunnel effect to write data in the memory locations. In transistors that are part of memory cells, the *gate* is not in fact directly in contact with the environment, because it is separated by a very thin layer of insulating material, which means that the transistor is loaded and unloaded through the tunnel effect. These components could not otherwise operate.

EMC: acronym of **E**lectro**m**agnetic **C**ompliance. The EMC standards define the levels of emissions and immunity of electronic devices. The emission defines the maximum level of electromagnetic noise that a controller may issue at a network level, while immunity is the maximum level of noise that the controller can tolerate.

ENTHALPY: it represents a status function, **H**, of a thermodynamic system **S**, like a fluid (liquid, vapor or gas), which indicates the energy status of the system. The variation of enthalpy can generally be regarded equivalent to the heat exchanged at constant pressure.

FAN: fan

FAST-ON: type of quick-fitting connection formed by a "male" connector, which is generally fitted on the regulator, and a "female" connector that is connected to the cable that supplies power to the connected load.

FIRMWARE: software (limited in size and capability) that resides in a hardware component, generally the microprocessor of an electronic controller, and that enables it to perform specific tasks.

FLA: acronym of **F**ull **L**oad **A**mpere. It represents the rated current of an electric motor.

HARDWARE: it identifies the physical components of a PC or electronic regulator, i.e. all the mechanical, magnetic, optical and electronic parts that enable the PC or electronic regulator to operate, depending on its complexity and the algorithms that have to be processed.

ANALOG INPUT: in electronics the term analog identifies a method used to represent the electric signal of a specific (voltage-operated) device; the signal is called analog when the useful values that represent it are continuous (infinite). Analog inputs can be configured to detect current (A or mA), voltage (V or mV) and resistance values (PTC, NTC and Pt100 probes).

DIGITAL INPUT: it is the opposite of an analog input and can be referred to electric signals or instrumentation. A digital signal does not exhibit continuous changes over time. In other words, it acquires a specific number of possible statuses (for example 0 and 1) and enables information to be transmitted through a preset sequence of said values. In Eliwell instrumentation, digital inputs detect statuses 0 (disabled) or 1 (enabled) or vice versa, depending on polarity, and perform the tasks related to such statutes.

LCD: liquid crystal displays are flat and light displays that do not comprise mobile parts. The display is made by a liquid trapped in several cells. Each cell has electric contacts that enable an electric field to be applied to the liquid within the cell. The cells are contained within two screens polarized along the same axis.

LED: acronym of **L**ight **E**mitting **D**iode. Device that generates a luminous indication when electrically powered. Devices used in electronics can have different shapes and dimensions (the most common form is the one with "luminous dot light") and are used on displays to signal the status of a resource.

LIGHT: light

LRA: acronym of **L**ocked **R**otor **A**mpere. It represents the current of an electric motor with locked rotor and is equivalent to the torque current.

MICROPROCESSOR (uP): a **microprocessor** is a single built-in circuit able to take decisions, perform calculations or process information. The main microprocessor of a computer is called processor or CPU. Processors are circuits made of millions of transistors and other electronic components, which exploit the semiconductive properties of silica and the fact that it can easily be converted into an insulating material by doping. Transistors store information in the form of electric loads changing the level according to the operating logic of the circuit.

OFFSET: in the IT domain, an offset is a integer number that indicates the distance between two parts within a group of components with equivalent characteristics. Adding or removing an offset to/from a reference value means adding or removing a constant quantity.

OUT: output

OVERRANGE: this term identifies the increase of a measured value increases above the maximum limit. If the limit is 150 and the measured value is 172, the system is in an overrange mode.

P.I.D.: acronym that identifies a proportional/integral/derivative regulation used to control a process or to ensure a greater accuracy. See Bulletin no. 4-PID.

PARAMETER: numerical, alphabetical or alphanumerical information used by the device to perform specific tasks. A device can have a varying number of parameters.

CAPACITY STEP, STEP: part of a power that is divided into "n" parts, called "capacity steps" or "steps". The overall power can be represented by a single load (multi-stage compressor) or by several loads (several compressors respectively representing a step).

PLC: is the acronym of **P**rogrammable **L**ogic **C**ontroller, which represents a hardware component dedicated to the management of processes. PLCs run applications and process digital and analog signals received from sensors and transmitted to the actuators of industrial plants.

POWER SUPPLY, RATING: electric supply. The rating is generally printed on the labels of controllers next to the terminals, to indicate the power supply required to operate the controller (12, 12-24, 115, 230V…).

PROBE, SENSOR: sensitive components that are able to measure a specific magnitude.

PWM: acronym of **P**ulse **W**idth **M**odulation. **Pulse-width modulation** or **PWM** is a type of digital modulation in which information is coded to represent the duration of a signal pulse. The length of each pulse can be expressed taking as reference the interval between two subsequent pulses, which represents the *duty cycle*. A duty cycle equivalent to 0% indicates a pulse with a null length or in the other words the lack of signal, while a value of 100% indicates that the pulse ends when the next one starts.

RANGE: indicates an interval delimited by a minimum and maximum value within which a process has to change or that must be met to ensure the optimum operation of a device.

RELAY: mobile contact constituted by a conducting material that is piloted by a magnetic coil. The controller enables the transition of a very low current through the transistor, which is however sufficient to create an electromagnetic field in the coil, which in turn shifts the position of the contact from one pole to the other by means of a lever system. Relays used in controllers can be SPST (Single pole\ Single throw) models with a normally open contact only or SPDT (Single pole \ double throw) models with normally open and closed contacts. The latter type of relay is also called exchange relay. Relays act as switches, i.e. section the load in order to permit or prevent the transition of current. Current and voltage define the technical characteristics of a relay, which must always be taken into account before using the relay to monitor the load. Rated current is specified by means of two values that respectively represent the resistive and inductive load. For example: 250 Vac 8(3)A indicates that the contact is able to withstand a voltage of 250Vac at a maximum current of 8 A for resistive loads and at 3 A for inductive loads.

RTC: acronym of **R**eal **T**ime **C**lock.

RJ11: identifies a connection with telephone jack.

RJ45: special type of connector used in local networks, constituted by 4 single-pole cables and used to connect the network workstations to a central HUB.

SET POINT: the set point value indicates the target value that has to be reached. It is generally referred to a physical magnitude such as temperature, humidity or pressure and generally represents the value that has to be reached or maintained within the environment being monitored. A practical example could be a refrigerator that has to maintain a temperature of +4°C. This value represents the set point and is also the point in which the load is disconnected from the controller at the end of the regulation.

SOFT START: process by which a process variable, generally temperature, is gradually increased to prevent overtemperature problems.

SOFTWARE: set of programs and data used by PCs. It includes "basic software" and "application software", depending on whether the software is used to manage the basic tasks of a processor or to perform specific tasks like the processing of documents, the management of accounting operations, the recording and transmission of data…

SSR: acronym of **S**olid **S**tate **R**elay. The use of this type of relay eliminates the need of using a mobile contacts because it enables to supply the required voltage directly to the piloting circuit of the load. Available power is however limited. SSR outputs of controllers can generally supply maximum voltages of 24Vdc and currents of 12mA.

PHASE CUTTING: term used to define the type of regulation, which may result in the modulation of the speed of a motor or fan, or of the light intensity of a bulb. By appropriately regulating the connected load, it is possible to supply a variable voltage that is directly or inversely proportional to the input signal. A high temperature corresponds to a high speed.

STORAGE TEMPERATURE: range of ambient temperature within which the controller must be stored before use. If this temperature is -30…60°C, the temperature of the area in which the controller is stored may range from -30°C to 60°C.

OPERATING TEMPERATURE: range of ambient temperature that must be maintained to ensure the correct operation of a device. For example: if the operating temperature is -5…55°C, the device will operate correctly at all ambient temperatures ranging from -5 to 55°C.

TRANSDUCER: device able to convert a physical magnitude into another one. This term generally identifies a device that converts non electric magnitudes into electric signals. The most common type of transducers are pressure transducers that are able to convert pressure values into an electric signal (mA or V).
TTL: acronym of the **T**ransistor **T**ransistor **L**ogic transmission mode, which is based on low voltage digital signals (0-5V). The protocol used can be standard or proprietary.
NON CONDENSING HUMIDITY: range of ambient humidity within which the operation of a device is guaranteed. For example: if the non condensing humidity is equivalent to 0…90%, the device operates correctly at all humidity values ranging from 10 to 90%. However, the environment should not allow condensation, i.e. the conversion of the water vapor in the air into water, which could deposit on the printed circuit and cause short circuits or failures. It is generally represented by the 5-way white connector fitted on ID, ECH, IWP models.
UNDERRANGE: term that indicates that a measured value falls below the minimum limit. For example: if the minimum limit is -50 and the measured value is -63, the system is in an underrange status.
ANALOG OUTPUT: in electronics the term analog refers to a method used to represent an electric signal within a specific (electrically powered) device. A signal is analog when the useful values that represent it are continuous (infinite). On analog outputs the signal does not only have two values (0 or 1, depending on whether the device is off or on), but can acquire a wide range of values that change in time. Signals are generally output in current or voltage (mA or V) and may be proportional to the temperature value. For example: range 5…10°C can be converted into a 4…20mA signal, where 5°C=4mA and 10°C=20mA.
DIGITAL OUTPUT: it represents the part of the controller that regulates a physical magnitude by enabling/disabling the load. It is called digital because it enables the use of two statuses only (Enable/disable, On/off). Digital outputs can be attained with a combination of devices such as relays and SSR devices.
NEUTRAL/DEAD ZONE: the regulation of a physical magnitude is generally performed to increase or increase its value by converting the related energy. Thus, regulation is not performed in one direction only. When the set point is reached, the load is disabled but the set point of the system is exceeded due to the thermal inertia of the system. Thermal inertia depends on the manufacturing characteristics of the device and on its inertial mass. This physical phenomenon may damage the device or system. Therefore, in applications where the set point must be reached and maintained with severe tolerances, it is generally necessary to install controllers that enable the regulation to be carried out in the dead zone. In this case regulation is performed in both directions (increase and decrease) because of the need of guaranteeing the compliance with the set point. This approach enables to counterbalance inertia with an inverse action.

Glossary: software and systems

ADSL: acronym of **A**symmetric **D**igital **S**ubscriber **L**ine. This technology enables fast accesses to Internet (i.e. broadband connections). Transmission rates start from 256 kilobits per second (kb/s) as compared to those of traditional modems, which are equivalent to a maximum of 56 kb/s, and ISDN lines with a maximum of 128 kb/s.
BIT: in the IT and information science domains, bit (that is the acronym of "BINary digiT") has two very different meanings depending on the context in which it is used. A bit can be a binary digit, i.e. one of the two symbols of the binary enumeration system, generally referred to as zero (0) and one (1). However, a bit may sometimes represent the minimum amount of information needed to differentiate two options. Eight bits form one byte, 1024 bytes are equivalent to one kilobyte (Kb), one million bytes to one megabyte (Mb), one billion bytes to a gigabyte (Gb), 1024 gigabytes to a terabyte.

BYTE: basic memory unit consisting of 8 bits. A byte generally represents one character, like a number, letter or symbol. However, as a byte is a very small unit, the capacity of the hard disk and main memory is generally expressed in kilobytes.
CRC: acronym of **C**yclic **R**edundancy **C**heck. Method used to detect errors in the data being transmitted with several communication protocols. It basically consists in transmitting additional data (CRC) at the time data is transmitted. The device that detects the data package is able to interpret additional data and replies in turn with additional CRC data. Receivers and senders check the integrity of the data using the CRC analysis. CRC can be calculated with different methods.
DRIVER: in the IT domain, a driver is a code that enables the operating system to "pilot" a hardware device. Drivers enable the operating system to use the hardware without having to know how it works, by simply communicating through a standard interface that reads the logical operation from the hardware. This approach enables hardware components of different manufacturers to be used.
ETHERNET: system generally used to connect computers within a LAN. Ethernet is able to manage approximately 10Mbits per second and can be basically used by all types of computers.

IMAP: acronym of Internet **M**essage **A**ccess **P**rotocol. Standard protocol used to receive e-emails. The IMAP protocol enables e-mails to be managed and maintained directly on the mail server, unlike the POP3 protocol that deletes e-mails after they have been downloaded and read. The IMAP protocol enables to maintain a centralized and shared mail storage.
HUB: device that enables to multiply a port of a device. If the PC has 2 USB ports and you have 4 devices (for example keyboard, mouse, printer and scanner), you can connect them all to the HUB, then connect the latter to one of the ports leaving the other one free for future uses.
IP ADDRESS: numerical code that identifies a PC connected to a LAN or Internet. It is constituted by four numerical series with a maximum of 3 digits, each of which ranging from 0 to 255. 62.11.4.101 is a typical example of IP address. "Public" IP addresses are generally dynamic, i.e. they change for every new connection. However, IP addresses can also be static, which means that the same addresses are used for each connection.
SERIAL INTERFACE OR CONVERTER: module that receives the signal transmitted with a specific standard and converts it into a different standard. Eliwell instrumentation is fitted with a TTL-RS485 interface or converter (for devices with TTL port designed to be connected to RS485, Televis or Modbus networks).
INTERNET: acronym of **INTER**national **NET**work". Large set of interconnected networks that use the same communication protocol (TCP/IP).
ISDN: acronym of **I**ntegrated **S**ervices **D**igital **N**etwork. Communication standard used to transmit information in digital format through the telephone line. ISDN connections generally offer two independent lines (for voice and data transmissions) that are each able to transfer data at rates of 64Kbps or of 128Kbps when paired.
LAN: in the IT world, LAN is acronym of **L**ocal**A**rea**N**etwork.

LICENSE: in the IT domain a license is a contract supplied with a software product, which specifies the terms to comply with to use the product along with rights and obligations. The license is released by the company that owns the copyright of the software product. Licenses are valid only if the copyright is available because only the owner of the copyright is entitled to claim the compliance with the terms stated in the license.
MODBUS: standard communication protocol used in different applications, including automation, regulation and supervision. The term ModbusMaster is used to identify a device that is able to read and write variables to/from other devices using the Modbus protocol, while the term ModbusSlave is used to identify a controller that is only able to reply to the master's requests.

MODEM: acronym of **MOD**ulator and **DEM**odulator). Device used to receive and send data, which is able to translate (modulate) the digital signal output by a computer during the transmission phase and to translate (demodulate) incoming signals during the reception phase using an analog line.

NIBBLE: unit of measurement that represents a quarted bit.

OCX/OLE: function libraries (for example the library that contains the drivers required to read devices, the library that contains the functions required to read a database, etc.). The main characteristic of this type of libraries is the standard method used to represent functions, which is usually referred to as **standard interface**. Users of these libraries are able to view **Methods** (the actual functions), **Events** and **Properties**. These libraries are developed with the COM technology (which has nothing to do with the serial port) and are generally called **ActiveX controls**. Depending on the use and features, **ActiveX** controls are supplied (and compiled) in different formats. The two main ones are the following:

- With **OCX extensions**: these components are generally used in Visual Basic, Excel, Access, etc., and comprise small or average-sized libraries with graphical features (for example calendars for the selection of day, month and year...)
- **OLE** Custom Control. These are custom controls (objects) compliant with OLE specifications. They represent functional modules used by programmers to build part of 32-bit applications. They can be substantially regarded independent programs accessible to applications developed in Windows.

OPC: function library that uses a different interface as compared to ActiveX controls, i.e. an interface specifically developed to be used with SCADA programs. These libraries are basically designed to be used with SCADA programs.

POP3: acronym of **P**ost **O**ffice **P**rotocol **3**. It identifies a simplified e-mail management protocol. This protocol requires the installation of a client to be able to read and write e-mails offline.

PROTOCOL: set of rules and conventions used for the transmission and reception of data between two computers. The protocol defines the format, synchronization, sequence and control of errors used on the network.

ROUTER: in the networking domain, a router is a network device that routes packets to different and heterogeneous networks.

RS232: standard that describes the interface and communication protocol used for the serial connection of computers and devices. RS-232 is the interface used by computers to communicate with modems and other devices connected to the serial port. RS232 male and female connectors are normally type DB9, i.e. with 9 pins.

RS485: this is the name of the standard that describes the communication interface for serial connections between a network of devices and the PC (the latter is generally connected by means of an appropriate converter). The network, generally based on 3 wires, enables to reach longer distances as compared to those specified in standard RS232. The communication protocol can be a standard one (for example Modbus) or a proprietary one, i.e. one created according to specific rules (for example the Eliwell protocol).

RTU: acronym of **R**emote **T**erminal **U**nit, i.e. a remote device used in automation and monitoring systems.

SCADA: acronym of **S**upervisory **C**ontrol **A**nd **D**ata **A**cquisition. The term identifies large-scale systems used for measuring and monitoring purposes.

SERIAL (DB9, DB25): in the IT domain it often identifies the RS-232 or LPT connector of the PC, which is generally constituted by transmission (Tx), reception line (Rx) and grounding lines. It uses 9 or 25 pole cup-style connectors.

SERVER: computer that provides a service to other computers of the network. Computer dedicated to the execution of a specific service, like the management of a local or geographical network, the management of printing devices (print server), the exchange or sharing of data among computers (file server, database server), the delivery and forwarding of e-mail (mail server) or the storage of files of a Web site (Web server).

SMTP: communication protocol used by mail servers to send e-mails. Servers that send e-mails are called "SMTP servers". When configuring the account on the PC, each user must specify the address of the POP3 server (incoming mail) and SMTP server (outgoing mail).
TCP/IP: acronym of **T**ransmission **C**ontrol **P**rotocol/**I**nternet **P**rotocol, which represents the set of protocols used to connect several PCs to a local network or a single user to Internet.
USB: Universal **S**erial **B**us. Connection system for external devices. Low energy devices can be powered directly by the connection, while those that require a higher energy are powered by a separate power supply.
VPN: acronym of **V**irtual **P**rivate **N**etwork. It identifies a network that is not accessible to third parties, which enables a limited number of
users/sites to connect in a secure and encrypted mode, using the Internet as communication means.
WAN: acronym of **W**ide **A**rea **N**etwork. It generally identifies large networks with several geographical locations, generally constituted by connections among several LANs. The term also identifies a network that connects computers located in wide distributed geographical areas.
WORD: a set of one or more BYTES considered as unit for a specific type of processor. A word is normally constituted by two bytes due to the fact the word of processors was originally constituted by two bytes. This term technically defines the number of BITS that the processor is able to handle in parallel.

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