PLC Tag & Address Naming Conventions

http://automationprimer.com/plc/

Factory automation and process control tag-naming matters for consistency, understanding, and troubleshooting. Courtesy: Frank Lamb, Automation Consulting, Automation Primer

Prior to this millennium, programmable logic controller (PLC) addresses were register based. Data was kept in registers with addresses like MW210, B3:6/2, N7:50, or DB5.dbx50.2. They're not very descriptive, are they?

These addresses could be assigned a "Symbol" or shortcut that would make them easier to program or find, but symbol names were often limited in length. Symbols also were not kept in the PLC; only on the programming computer and in the software.

Descriptions also could be assigned to the addresses, but they also were only present in the software. They provided extra information about the address and its purpose, but were not searchable.

With the advent of tag-based PLC systems, the address became much more descriptive, and the register-based addresses were hidden from view. Tag names have different rules depending on the brand or platform of the PLC. They can be 40 or more characters in length and use alphanumeric characters. Some platforms allow spaces while some require an underscore instead.

Tags are downloaded

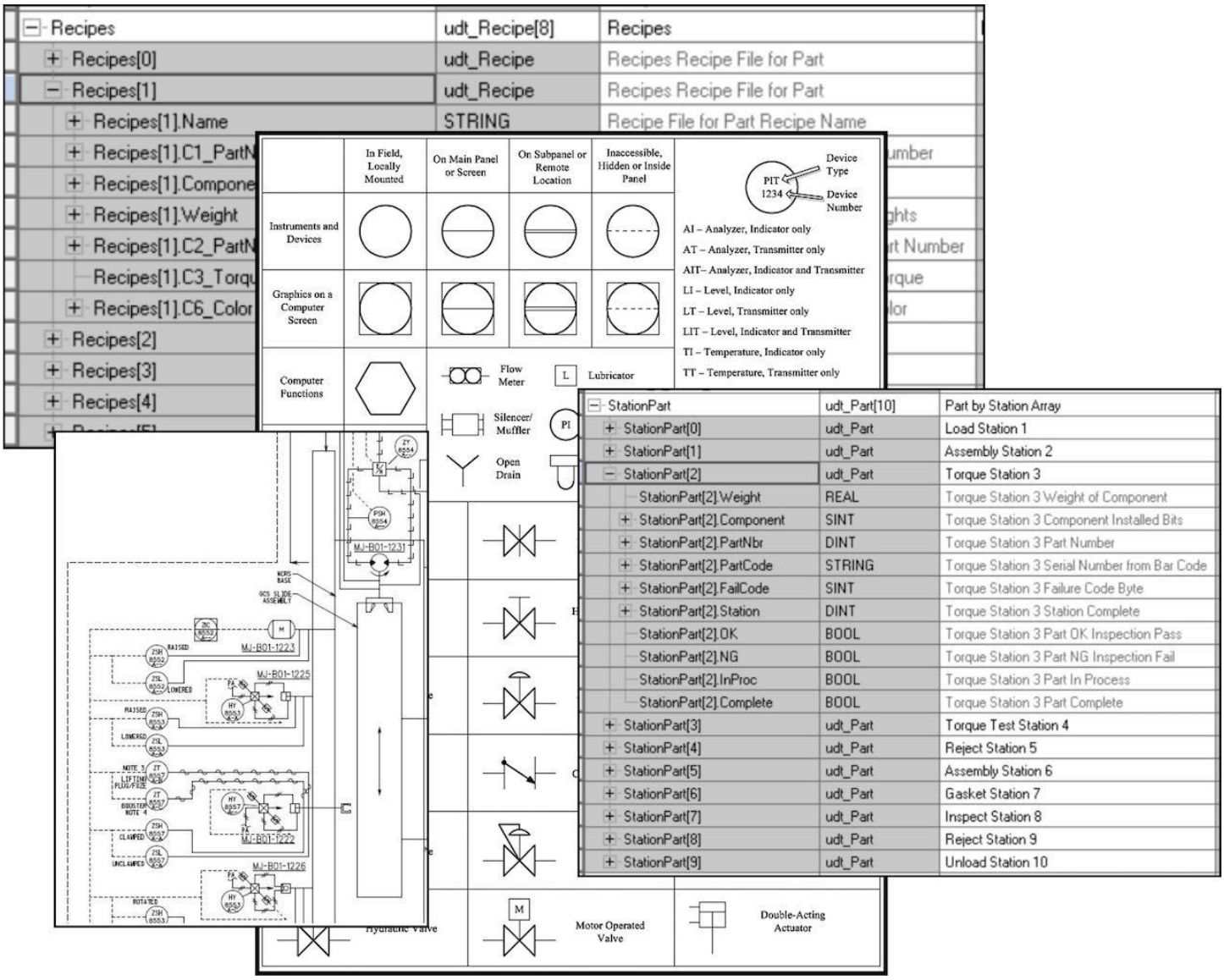
Tags are actually downloaded into the PLC. They also can be organized alphabetically or numerically in the tag database, making the naming convention important. Since so many characters can be used, tag names can be quite descriptive and contain a lot of information. At the same time, long tag names with too many abbreviations can be hard to read.

Common functions or terms such as AutoMode, AutoCycle, Fault or CycleStop are pretty common in industry and don't require a lot of extra information. Systems or machines might be divided up into zones or stations and labeled Zone2, Cell15 or Station003, these tags could take a bit more documentation or description.

UDTs (User Defined Data Types) also have made the tags more complex by allowing "dotfields." An example might be "VFDrive2100.ActualSpeed" or "pOP150.ToSCADA.SEvents.Call.ForSupervisor". Nesting UDTs allows for tags like the last example.

Tag templates

Larger companies and machine builders/system integrators usually create a template for programming that lays out how tags will be named. Many common tags already will be created in a template program, and others will be automatically generated from a spreadsheet. The conventions used will differ from company to company, but the intent is the same: to make the program more readable and easier to troubleshoot.



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There are two major divisions of tag naming philosophies. In the manufacturing industries such as automotive and other products, devices are often named by their function and location. They also often include a number referencing a page and line where the device is located in the electrical drawings. An example of this might be “PalletPushCyl_ExtPX_4120”. This example indicates the Assembly (Pallet Pusher Cylinder), the Device and its position (Extended Proximity Switch), and the location in the electrical drawings (Page 41, Line 20).

Factory tagname abbreviations

Devices in manufacturing often are designated by abbreviations as listed below:

- Photoelectric Sensor: PE, PEC, PER
- Proximity Switch/Hall sensor: PX, PRX
- Limit Switch: LS
- Master Control Relay: MCR
- Pushbutton: PB, hPB (HMI)
- Switch: SW

- Solenoid Valve: SV
- Control Relay: CR, K
- Motor Starter: MS.

The second school of thought is from process control industries, such as petroleum or chemical processing. Their technicians depend on their process and instrumentation diagrams (P&IDs). Coding guidelines for these are supported by ISA, but may differ from company to company.

These drawings assign unit numbers to assemblies like tanks or skids and loop numbers to the different control components like instruments and sensors.

Because device names are controlled, tag names in the process industries only include the P&ID number rather than the more descriptive method used in manufacturing. These designations are quite different than those used in manufacturing.

For instance, a flow transmitter might be designated as 20-FT-1982-A, where the area is 20, FT is the type of sensor, 1982 is the loop number, and A means there is at least one other redundant device. Because tags can't start with a number on many platforms, the order of characters may be changed, or a letter may be attached before the unit number. The tag for the device above might then be FT_20_1982A or d20_FT_1982A. This type of tag may not be as descriptive as those used in manufacturing, but a description might be attached reading "Flow Transmitter A for Loop 1982 in Unit 20.

Process tag abbreviations

Devices might use designations like those listed below:

- Flow Transmitter: FT
- Valve: HV, FV
- Limit Switch: LSL (Low), LSH (High)
- Loop Control: FIC, PIC
- Pushbutton/Switch: HS, HIS
- Photoeye, Proximity Switch: ZS
- Motor Starter: M
- Pressure Transmitter: PT, PIT.

The main consideration when creating tagnames is to remember the technician or maintenance person is the customer. The more the programmer can do to help someone find and understand the code, the better.

Five tag and address naming tips

Naming conventions for device or unit tag names matter to aid understanding and speed troubleshooting. Here are five important things to consider when deciding on tag names templates or rules:

1. Make names as descriptive as possible as to the function of the tag. Use standardized terms and abbreviations technicians will understand. Add descriptions if necessary.
2. Tags will appear in alphabetical and numeric order, so beginning tags with the same function or area letters/numbers is important for organization.
3. Use underscores or capitalization wherever necessary to make the tag more readable.
4. If the software platform allows for local tags, assign all tags for a particular assembly or program before copying it to duplicate programs. This can save a lot of time.

5. Use a spreadsheet to create tags. This is easier than typing tags manually into a database. Tags can be incremented and duplicated more easily. PLC platforms allow for easy export/import of tags. This also ensures programmers use the same names as electrical and mechanical designers.

Actuators
Extend – Retract
Advance – Return
Raise – Lower
Advance – Home
Rotate CW – Rotate CCW
On – Off

Mechanism
Lifts – Fingers
Indexer – Shuttle
Locators – Clamps
Pre-Stop – Entry Stop
Elevator – Lift

Machine Sub-Elements
Robots
Vision Systems
RFID Readers/Writers
Conveyor Traffic Control (stops, lifts, etc.)
Loaders/Palletizers/Depalletizers
Torque Drivers/Screw Drivers
Safety Circuits
System Control

Note: Numbers in parentheses refer to explanatory notes in Clause 5.3.2

Analysis

AIR	= Excess air	H2O	= Water	O2	= Oxygen	UV	= Ultraviolet
CO	= Carbon monoxide	H2S	= Hydrogen sulfide	OP	= Opacity	VIS	= Visible light
CO2	= Carbon dioxide	HUM	= Humidity	ORP	= Oxidation reduction	VISC	= Viscosity
COL	= Color	IR	= Infrared	pH	= Hydrogen ion		=
COMB	= Combustibles	LC	= Liquid chromatograph	REF	= Refractometer		=
COND	= Elec. conductivity	MOIST	= Moisture	RI	= Refractive index		=
DEN	= Density	MS	= Mass spectrometer	TC	= Thermal conductivity		=
GC	= Gas chromatograph	NIR	= Near infrared	TDL	= Tunable diode laser		=

Flow

CFR	= Constant flow regulator	OP	= Orifice plate	PT	= Pitot tube	VENT	= Venturi tube
CONE	= Cone	OP-CT	= Corner taps	PV	= Pitot venturi	VOR	= Vortex Shedding
COR	= Coriollis	OP-CQ	= Circle quadrant	SNR	= Sonar	WDG	= Wedge
DOP	= Doppler	OP-E	= Eccentric	SON	Sonic		=
DSON	= Doppler sonic	OP-FT	= Flange taps	TAR	= Target		
FLN	= Flow nozzle	OP-MH	= Multi-hole	THER	= Thermal		=
FLT	= Flow tube	OP-P	= Pipe taps	TTS	= Transit time sonic		=
LAM	= Laminar	OP-VC	= Vena contracta taps	TUR	= Turbine		=
MAG	= Magnetic	PD	= Positive displacement	US	= Ultrasonic		=

Level

CAP	= Capacitance	GWR	= Guided wave radar	NUC	= Nuclear	US	= Ultrasonic
d/p	= Differential pressure	LSR	= Laser	RAD	= Radar		=
DI	= Dielectric constant	MAG	= Magnetic	RES	= Resistance		=
DP	= Differential pressure	MS	= Magnetostrictive	SON	= Sonic		=

Pressure

ABS	= Absolute	MAN	= Manometer	VAC	= Vacuum		
AVG	= Average	P-V	= Pressure-vacuum				=
DRF	= Draft	SG	= Strain gage		=		=

Temperature

BM	= Bi-metallic	RTD	= Resistance temp detector	TCK	= Thermocouple type K	TRAN	= Transistor
IR	= Infrared	TC	= Thermocouple	TCT	= Thermocouple type T		=
RAD	= Radiation	TCE	= Thermocouple type E	THRM	= Thermistor		=
RP	= Radiation pyrometer	TCJ	= Thermocouple type J	TMP	= Thermopile		=

Miscellaneous

Burner, Combustion		Position		Quantity		Radiation	
FR	= Flame rod	CAP	= Capacitance	PE	= Photoelectric	α	= Alpha radiation
IGN	= Igniter	EC	= Eddy current	TOG	= Toggle	β	= Beta radiation
IR	= Infrared	IND	= Inductive		=	γ	= Gamma radiation
TV	= Television	LAS	= Laser		=	n	= Neutron radiation
UV	= Ultraviolet	MAG	= Magnetic		=		=
	=	MECH	= Mechanical		=		=
	=	OPT	= Optical		=		=
	=	RAD	= Radar		=		=
	=		=		=		=

Speed		Weight, Force					
ACC	= Acceleration	LC	= Load cell		=		=
EC	= Eddy current	SG	= Strain gauge		=		=
PROX	= Proximity	WS	= Weigh scale		=		=
VEL	= Velocity		=		=		=
	=		=		=		=

Family Type	Description		Family Type	Description
==========	==========		==========	==========
AM	Ammeters		MS	Motor starters/contactors
AN	Buzzers, horns, bells		OL	Overloads
BA	Batteries		PB	Push buttons
BV	Ball Valves		PC	Pull cord switches
C0, CN	Connectors/pins		PE	Photo switches
CA	Capacitors		PLCIO	Programmable logic controllers
CB	Circuit breakers		PG	A-plug switches
CR	Control relays		PM	Power meters
DB	Distribution blocks		PS	Pressure switches
DI	Diodes		PW	Power supplies
DN	Device networks		PX	Proximity switches
DR	Drives		RE	Resistors
DS	Disconnect switches		SP	Splices
DV	Device boxes		SS	Selector switches
EN	Enclosures/hardware		SU	Surge suppressors
FL	Level switches		SV	Solenoids
FM	Frequency meters		SW, TG	Toggle switches
FS	Flow sensors		T0, T1	Terminals
FT	Foot switches		TC	Thermocouples
FU	Fuses		TD	Timer relays
GV	Gate valves		TRMS	Terminal blocks
LR	Latching relays		TS	Temperature switches
LS	Limit switches		VM	Volt meters
LT	Lights, pilot lights		VR	Variable resistors
LV	Globe valves		WO	Cables, multi-conductor cables
MISC	Miscellaneous		WW	Wire ways
MO	Motors		XF	Transformers

Hydraulic family names			P&ID family names	
Family Name	**Description**		**Family Name**	**Description**
==========	==========		==========	==========
FI	Filter		CT	Equipment: Cooling tower
CYL	Cylinder		TK	Equipment: Cyclone
VAL	Valves (directional, throttle, pressure)		E	Equipment: Engine, exchanger
FC	Flow control valve		C	Equipment: Turbine, compressors
CK	Check valve		F	Equipment: Fans
MAN	Manifolds		M	Equipment: Mixer, agitators
PS	Pressure switch		TK, V	Tanks and vessels
MOT	Motor		N	Nozzles
PMP	Pump		P	Pumps
ACC	Accumulator		FIT	Fittings
CMP	compensator		GVA	Valves
MTR	Meter		ACT	Actuators
FS	Float switch		LOG	Logic Functions
HE, HTR	Heat exchanger, heaters		INS	Instrumentation
			FLW, FE	Flow