Rezzelle-Strickland Associates, Inc.

P&ID Master 2000

CREATE SMART PROCESS AND
INSTRUMENTATION DIAGRAMS,
LOOP SHEETS AND OTHER FLOW
DIAGRAMS QUICKLY WITH THE MOST
POWERFUL P&ID MASTER EVER

USER'S GUIDE

Contents

Introduction to P&ID Master

P&ID Master works inside of AutoCAD to create process and instrumentation diagrams, loop sheets, and other types flow diagrams. P&ID Master now includes the latest version of the *ToolChest* software. ToolChest adds to AutoCAD the “can’t do without” commands and hundreds of industry standard symbols. It is the perfect solution for a 2D drafting tool in the engineering, maintenance and operation department. With P&ID Master, the creation of smart process and instrumentation diagrams and other types of flow diagrams are quick and easy.

The P&ID Master Interface

All of P&ID Master's documentation is online for quick access. You can get help about a command or procedure by selecting Help from the P&ID Master menu.

You can also get help about the current command, menu item, or tool by using one of these context-sensitive methods.

- For a command, enter **'help** or press F1 while a command is active.
- For a dialog box, choose the dialog box Help button or press F1.
- For a menu, highlight the menu item and then press F1.

You use P&ID Master by running commands using one of these methods:

- Choosing a menu item
- Clicking a icon on the P&ID Master toolbar
- Entering a command

Most commands that can be entered on the command line can be found on a menu or a toolbar, and most commands have additional choices, or options. Some commands display these *options* on the command line, while others display them in a *dialog box*. You enter command line options by typing at least the capitalized portion of the option name and then pressing ENTER. You set command options in a dialog box by clicking the option with the *pointing device* and then choosing OK.

At the Command line, you can invoke the last-used command by pressing ENTER. You can exit any command by pressing ESC.

Starting a Drawing

When you start AutoCAD with P&ID Master, a new unnamed drawing is created for you. You can either start drawing in this blank drawing or open an existing drawing.

If you open an existing drawing created with P&ID Master all of the settings last used are restored. If this is the first time the drawing has been edited with P&ID Master, use ToolChest Setup to establish the default settings for the drawing. Access the command from the ToolChest pull-down menu and choose Setup Model Space.

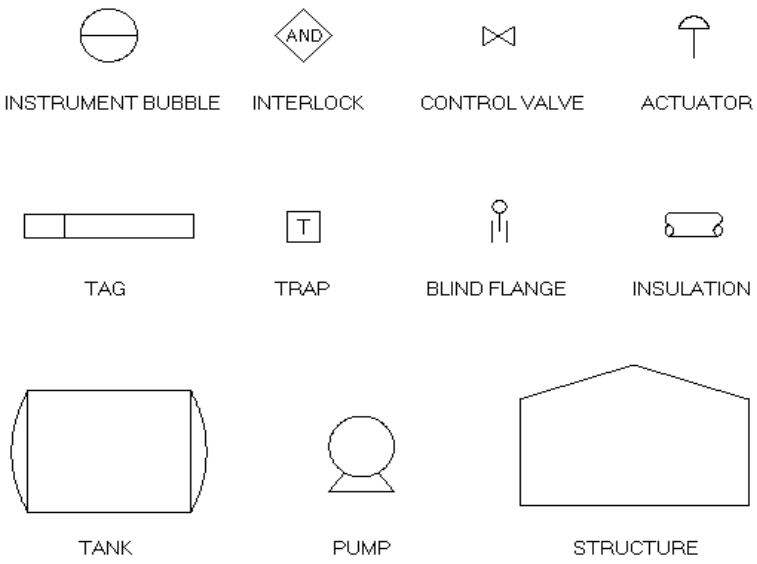
When you start a new drawing, there are a few settings you will want to establish to assist you during the drawing process. The ToolChest Setup will help you define the new drawing properties. However, you can change these basic settings.

- *Scale* determines the drawing scale factor. The scale you select will determine the scale factor P&ID Master uses when adding objects to the drawing and the drawing limits.
- *Linetype Symbol* properties control how P&ID Master Classic linetypes are drawn. The linetype symbol scale determines the size of the symbol and the linetype symbol spacing determines the distance the symbols are place apart from each other.
- *Layer Control* enables you to turn the P&ID Master layer feature on or off. The layer control will determine which layer a symbol or linetype will be created on, and if the layer does not exist in the drawing it is created for you.

P&ID Master uses a layer template to define which objects are associated to which layers, you can change these setting at any time with the P&ID Master Preferences.

Drawing Objects

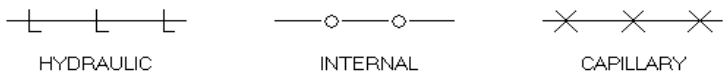
To help you draw the required *objects* for your drawings, P&ID Master has commands that create many different types of objects. The following illustration shows you some of the objects you can create.



In addition to creating these objects, P&ID Master provides the capability for creating a wide variety of new linetypes. P&ID Master can use layers to create simple linetypes, and blocks and shape files to create more advanced linetypes.

Layer linetypes are made up of line segments on specific layers.

Classic linetypes are made up of individual line segments and blocks that designate what type of line is being represented.



Standard linetypes use the new AutoCAD complex linetypes that have the shape embedded into the line. Using this style allows you to easily modify the lines without worrying about all the individual line segments and blocks that the Classic style uses.

Standard Symbols

Most drawings contain repetitive symbols (i.e., blocks), P&ID Master contains many symbols that are arranged in a variety of *symbol libraries* that conform with ANSI/ISA standards.

Symbol libraries contain similar types of objects such as instruments, functions, control valves, actuators, tags elements, and equipment. All of the P&ID Master symbol libraries can be modified while maintaining their attribute control. You can create or use your existing symbols with P&ID Master.

Customizing and Programming

One of P&ID Master's most important design feature is its open structure. You can customize virtually every aspect of P&ID Master. In addition, P&ID Master straight forward setup approach makes it even easier to tailor for your own requirements.

You can add, remove, or modify the items in the P&ID Master menu and toolbars. You can also alter or add to P&ID Master symbol files, shapes, and linetypes. P&ID Master uses AutoLISP, DCL (Dialog Control Language), and C++ language as it's primary interface with AutoCAD. See the online *Customization Guide* for more information.

What's New

P&ID Master has added many new features that will enhance the way you work. One major change is the addition of ToolChest, this software package is packed full of new utilities that make editing your AutoCAD drawing a breeze. Other changes include, instrument bubble symbol and attributes are now one object, functions to change the properties of instrument bubbles and valves, support of AutoCAD complex linetypes, and a new interface.

What's new in P&ID Master

- Includes ToolChest, a new software utility package for AutoCAD
- Uses a partial menu, this allows you to use your existing menus with P&ID Master
- Supports toolbars
- Digitizer template is supplied as a drawing file
- Instrument bubbles are furnished as individual drawing files
- Instrument bubbles and attributes are one object
- Edit the instrument bubble properties on screen
- Instrument bubble now have two fixed sizes that allow for a constant text height
- Change a valves open/closed status with one simple pick
- Easier to use symbol insertion programs
- P&ID Master functions are now AutoCAD commands, you can press ENTER to repeat the last command

Typographical Conventions

To orient you to P&ID Master features as they appear on the screen, specific terms are set in typefaces that distinguish them from the body text. Throughout this documentation, the following conventions are used.

Typographical conventions

Text element	Example
Pull-down menu selection	PID > Preferences
Prompts	<First point>/Property:
Text you enter	At the AutoCAD command line, enter **erase**
Keys you press on the keyboard The **Enter** and **Return** key are the same	DELETE, ESC
Keys you press simultaneously on the keyboard	CTRL+C
File or folder names, names of directories, and instructions after prompt sequences	*tablet.dwg* *C:\Rsa...\Com*
Named objects, such as layers ,linetypes, and styles, commands and system variables	LIGHT, MEDIUM, HEAVY RSALINE, RSAIBUB, RSAPIDPREF
Sample code, and text in ASCII files	The variable `pi` is preset to a value of pi `***POP1`
Function names	**(defun rsa:b101a ())**
Formal arguments specified in function definitions	The *string* and *mode* arguments

Chapter 1
Getting Started

Checking System Requirements

To run P&ID Master on Windows, the following minimum software and hardware is required:

- Windows 2000 or higher
- AutoCAD Release 2000 or higher

It is recommended that you install and run your copy of P&ID Master on an English version of one of the supported operating systems.

- 8 MB of hard disk space
- Computer hardware capable of running your current release of AutoCAD
- Digitizer (optional)
- For a more detailed listing of system requirements, see the *Installation Guide*

Installing P&ID Master

When you install P&ID Master, a setup program guides you through the process. The program transfers files from the CD to a folder that it creates on your destination drive. After you install the program, AutoCAD will need to be configured to run P&ID Master. To change any of the P&ID Master settings, select Preferences from the P&ID Master pull-down menu in AutoCAD and change the settings that apply to your needs. For a more detailed installation and configuration procedure, see the *Installation Guide*.

When the installation is complete, you are prompted to view the *Readme* file. This online document provides information that was not available at the time of the printing of this guide.

Starting P&ID Master

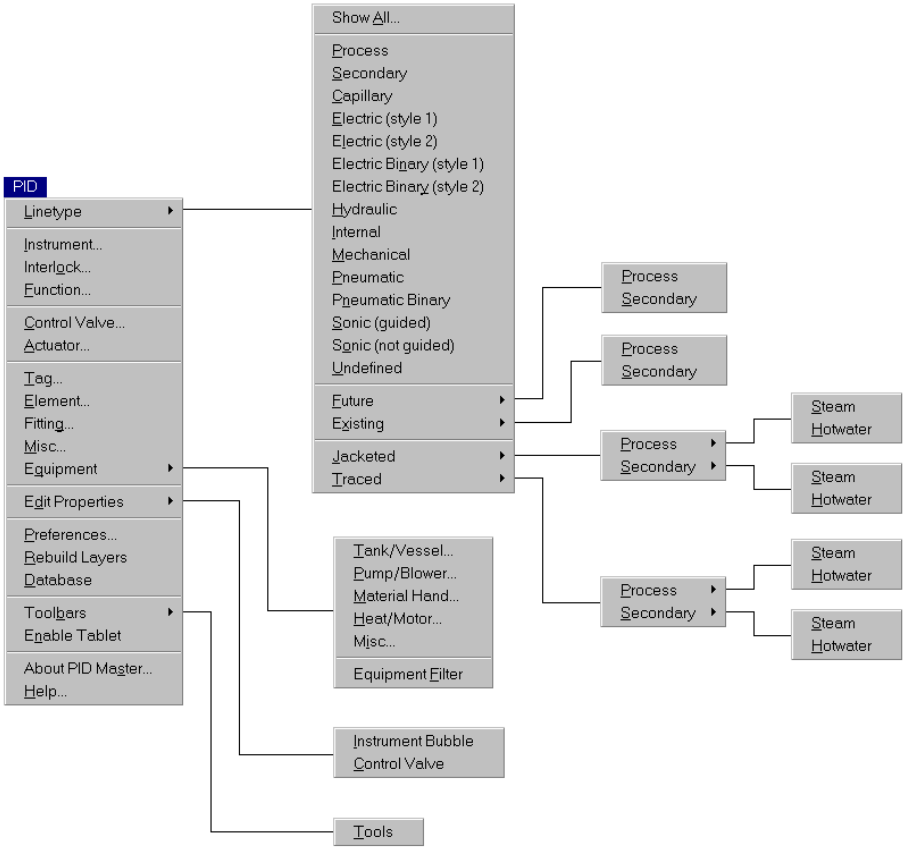
Start AutoCAD as you normally do, you can start using P&ID Master by doing the following procedure.

Type **menuload** on the AutoCAD command line and press ENTER. Load the *rsapid.mnu* menu file from the P&ID Master folder (i.e., *C:\Rsa..\Pid*). P&ID Master should now be loaded, and ready to use.

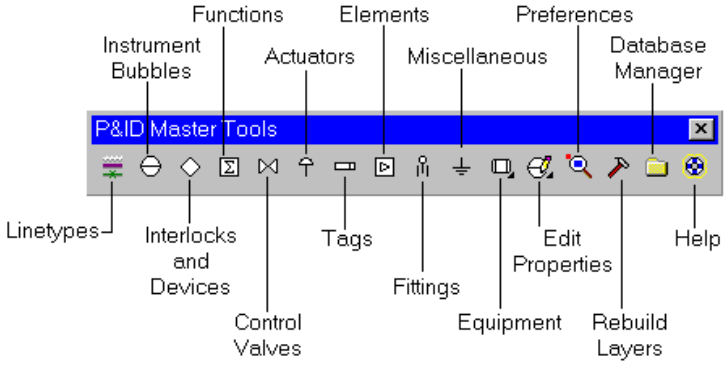
You can access P&ID Master through a pull-down menu, toolbar, and digitizer tablet. For detailed instructions on using a digitizer tablet, see the *Installation Guide*.

Understanding the P&ID Master Interface

When you start AutoCAD and P&ID Master is initialized, the menu bar at the top contains the P&ID Master menu. All of P&ID Master commands and libraries are available to you thru this menu.



The P&ID Master toolbar contain icons that represent P&ID Master commands and libraries.



Online Documentation

All of the P&ID Master manuals are available online. To view a manual from the P&ID Master menu, choose Help.

From the Contents tab, select the manual you want to view. Each manual contains a table of contents in which you can search for a specific section or topic. When you are in a particular section, you can click any underlined word to search for related documentation.

Accessing Information from Help

At any time during an AutoCAD session, you can access P&ID Master online help information. From the P&ID Master menu choose Help , or enter RSAPIDHELP on the AutoCAD command line and press ENTER.

Controlling Layers

P&ID Master will automatically place all objects on specific layers with its Layer Control System. You can easily change which layers are associated with the objects at any time. The layers that are used with the Layer Control System are controlled by the P&ID Master Preferences. Access this command from the P&ID Master pull-down menu, choose Preferences and then choose the Layers button. You can also enter RSAPIDPREF on the AutoCAD command line and press ENTER.

A *layer template* is used to define the layer names and their properties that will be used on the drawing. The *pid.lay* file is the default P&ID Master layer template, this file is located in the ToolChest common folder (i.e., *C:\Rsa..\Com*). You edit a layer template with the ToolChest Layer Template Editor. Access this command from the ToolChest pull-down menu, first choose Layer Utilities, then from the fly-out menu choose Template Editor. You can also enter RSALTED on the AutoCAD command line and press ENTER.

Modifying the P&ID Master Environment

You can change all of the settings that affect the interface and drawing environment with the P&ID Master Preferences. For example, you can set the diameter of instrument bubbles, and you can specify the offset distance for traced and jacketed linetypes. Experiment with the settings in the Preferences dialog box until you find the best environment for your needs.

Change the P&ID Master Settings

1. Using the P&ID Master pull-down menu choose Preferences.
2. Modify the settings.
3. Choose OK.

Command line RSAPIDPREF

Updating Existing Drawings

You may have drawings that were not created with P&ID Master, it will be necessary to *setup* these drawings. The setup will tell P&ID Master what scale to use with the drawing when inserting symbols. There are several types of drawings that you will need to setup before using P&ID Master.

- AutoCAD drawings not created with P&ID Master
- Drawings created with the AutoCAD WBLOCK command
- Drawings created with previous versions of P&ID Master

When you edit such a drawing P&ID Master will attempt to determine the default drawing scale, but it is always a good idea to check and make sure it is correct. You can use the ToolChest Setup to check and modify the drawing setup. After changing a drawing setup, make sure you save the drawing so the modifications will be saved.

Update Drawing Scale

1. Using the ToolChest pull-down menu choose Setup Model Space (Tiled).
2. Modify the settings.
3. Choose OK.

Command line RSASETUP

Inserting Symbols

P&ID Master provides many types of symbols for you to use on a drawing. You will notice that some symbols are capable of breaking lines that touch the symbol, while other symbols will not a break line. All symbols are inserted on the drawing in the same manner.

```
Insertion point:
Rotation angle <0>:
```

When you choose a P&ID Master symbol read the AutoCAD command line carefully, some symbols require different information before it is inserted on the drawing. Many of the symbols preset the AutoCAD object snap for the symbols most common insertion type. You can always override the object snap by choosing a different one.

Error Messages and Error Recovery

Because P&ID Master adds on to AutoCAD, you will see prompts and error messages generated by both programs. You will come to recognize the source of each message, but always make sure after you have dealt with a problem and that the error recovery procedures were indeed successful.

Normally if you enter an invalid reply to a prompt, you will be prompted again, you can exit a P&ID Master command by pressing the ESC key. If a command fails or you exit a command, P&ID Master will automatically restore any settings it may have changed during execution of the command. However, if the error recovery was not successful you can manually reset the P&ID Master environment.

To manually reset P&ID Master

1. Using the ToolChest pull-down menu choose Tools.
2. Choose Reset From Error.

Technical Support

If you are having problems with P&ID Master please contact us. Call our technical support team Monday thru Friday, 8:00 a.m. to 5:00 p.m. Eastern Time, at (706) 793-9614. Or you may fax us at (706) 793-2232, please include all the information you can about the problem.

Command Reference

Command	Toolbar & Icon	Pull-Down Menu
RSABEDIT	Tools 	PID > Edit Properties > Instrument Bubble
RSAFILTER	Tools 	PID > Equipment > Equipment Filter
RSAIBUB	Tools 	PID > Instrument
RSAJACKET	Tools 	PID > Linetypes > Jacketed
RSALINE	*Not Available*	ToolChest > Line Construction > Line
RSALTED	*Not Available*	ToolChest > Layer Utilities > Template Editor
RSAPIDDB	Tools 	PID > Database
RSAPIDHELP	Tools 	PID > Help
RSAPIDPREF	Tools 	PID > Preferences
RSASPEC	Tools 	PID > Tag
RSATRACE	Tools 	PID > Linetypes > Traced
RSAVALVE	Tools 	PID > Control Valve
RSAVEDIT	Tools 	PID > Edit Properties > Control Valve
RSAVTRACE	Tools 	PID > Control Valve

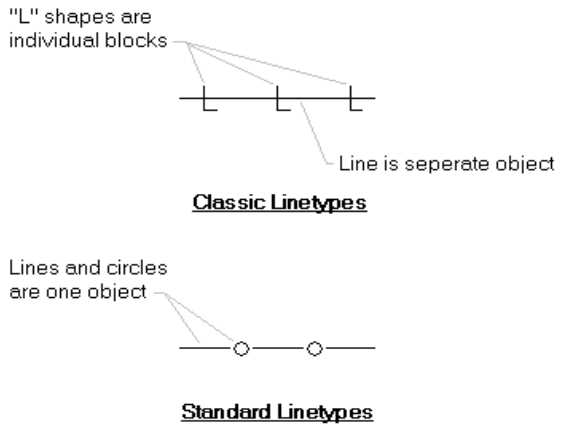
Chapter 2
Linetypes

Classic and Standard Linetypes

P&ID Master contains many different types of lines to be used on drawings and all the P&ID Master linetypes meet ANSI/ISA standards. You can have P&ID Master create the linetypes two different ways on your drawing. The *Classic* or *Standard* styles offer different advantages depending on how you draw, and since both styles can be customized you are not limited on how the linetypes will look and plot.

- *Classic* linetypes are made up of individual line segments and symbols that designate what type of line is being represented. You can modify the scale and spacing of the symbols that make up the Classic linetype while you are drawing the line.

- *Standard* linetypes use the new AutoCAD complex linetypes that have the symbol embedded into the line. Using this style allows you to easily modify the lines without worrying about all the individual line segments and symbols that the Classic style uses. The only draw back in using this style is that the AutoCAD *acad.lin* file must be modified to define the new linetypes and the shape file *rsapid.shx* is required to be located in a folder that is in the AutoCAD support directory path. The *rsapid.shx* shape file can be distributed royalty-free with drawing files created by P&ID Master.



Both styles create the same linetypes and you may use both on a single drawing. Use the Preferences to set the default linetype style.

Using the P&ID Master Linetypes

While some P&ID Master linetypes use symbols to designate their type, and others use varying line segments, all linetypes are created the same way on the drawing. Choose from the many linetypes that are included on the P&ID Master menu, the linetypes will automatically be placed on a designated layer while you drawing them.

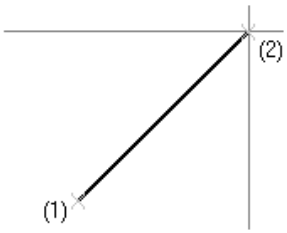
Drawing a linetype

1. Using the P&ID Master pull-down menu choose Linetype. From the fly-out menu choose the linetype you want to create.
2. Specify the start point (1).
3. Specify the endpoint (2).
4. Specify the endpoint of the next segments.
5. Press ENTER to complete the line.

Command line RSALINE

Related To undo the previous line segment while creating a P&ID Master linetype, enter **u** and press ENTER. To modify the line segment properties, enter **p** and press ENTER.

NOTE Make sure you set the Classic and Standard linetype style to the appropriate setting before creating a linetype on the drawing.



Once you have drawn a P&ID Master linetype by either selecting it from the PID > Linetype pull-down menu or the Tools toolbar, that linetype will be set to the default ToolChest linetype. You may then use the ToolChest RSALINE command to draw the default linetype until you choose a different one.

Setting Linetype Properties

P&ID Master supports several kinds of linetypes, you can modify the property settings of each type to change how it will be displayed on the drawing. Some use a layer to designate their linetype, while others use the P&ID Master Classic and Standard styles. Each is unique in the way its properties are changed.

Change the layer of a linetype

1. Using the P&ID Master pull-down menu choose Preferences.
2. Under Layer, choose the Layers button.
3. Choose the linetype name (i.e., Capillary Linetype, Electric 1 Linetype...) from the list box.
4. Choose the Layer button, select a layer to assign to the linetype and choose OK.
5. Choose OK.

Command line RSAPIDPREF

Layer Linetypes

P&ID Master linetypes that use only a layer to define its type are among the simplest to modify. These linetypes are normally designated by a series of dots and dashes, and are created with simple AutoCAD linetype definitions that are defined in the *acad.lin* file.

The layer linetypes can be created with the ToolChest RSALINE command or the AutoCAD LINE command. If you are using P&ID Master to create your linetype the RSALINE command will be automatically be used. If you would like to use the AutoCAD LINE command, first make the desired layer current and then draw the line segments.

You can modify this linetype by changing its linetype scale with AutoCAD, or you may want to edit the properties defined in the *acad.lin* file. For more information on customizing the AutoCAD linetype definition file *acad.lin*, see your AutoCAD documentation.

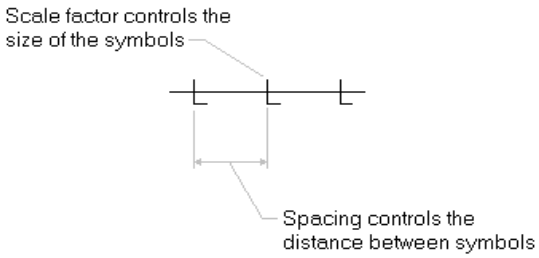
Classic Linetypes

P&ID Master linetypes that use the Classic style can have their properties set while you are drawing the line. These linetypes are made up of individual line segments and symbols, you can control the scale and spacing of the symbols for each line segment.

The Classic linetypes are created with the ToolChest RSALINE command. Use the **Property** option of this command to set the symbol *scale factor* and *spacing* while you drawing the line.

- *Scale factor* is used to scale the symbols inserted on the line, you can vary the symbol size by changing this value. The default size of 1.0, inserts the symbols at *full scale*, increasing this value to 2.0 will cause the symbols to be inserted at twice their normal size. Reducing the scale factor will decrease the symbol size.

- *Spacing* determines the distance symbols are inserted apart from each other.



Standard Linetypes

P&ID Master linetypes that use the Standard style have their properties defined in the AutoCAD *acad.lin* linetype definition file. These are *complex* linetypes that contain embedded shape and text objects along with dots, dashes, and spaces. The P&ID Master linetypes are added to your *acad.lin* file during installation and are also defined in the P&ID Master *rsapid.lin* linetype definition file. The *rsapid.lin* file is located in the P&ID Master root folder (i.e., *C:\Rsa...\Pid*).

Standard linetypes can be created with the ToolChest RSALINE command or the AutoCAD LINE command. If you are using P&ID Master to create your linetype the RSALINE command will be used, or if you would like to use the AutoCAD LINE command, first make the desired layer or linetype current and then draw the line segments.

You can modify this linetype by changing its linetype scale with AutoCAD, or you may want to edit the properties defined in the *acad.lin* file. For more information on customizing the AutoCAD linetype definition file *acad.lin*, see your AutoCAD documentation.

Flow Arrows

All P&ID Master linetypes can have a flow arrow automatically inserted on each line segment. When a line is drawn, you specify a *start point* (first point) and a *endpoint* (second point), the flow arrow is inserted at the endpoint and rotated at the same angle of the line. To toggle flow arrows on or off, use the **Property** option when using P&ID Master to create a linetype.

```
From point:
Property/<To point>:
```

Traced and Jacketed Linetypes

The P&ID Master traced and jacketed linetypes are drawn with a process or secondary supply line segment. The trace or jacket lines are created parallel to the supply line drawn, you can specify the default distance the trace or jacket lines are offset from the supply line with the Preferences. The supply line can be traced or jacketed with steam or hotwater lines.

Drawing a traced linetype

1. Using the P&ID Master pull-down menu choose Linetype. Then choose the Traced style.
2. Specify the start point.
3. Choose the side the trace will be on.

   Indicate side for trace:

4. Specify the endpoint.
5. Specify the endpoint of the next segments.
6. Press ENTER to complete the line.

Command line RSATRACE

Drawing a jacketed linetype

1. Using the P&ID Master pull-down menu choose Linetype. Then choose the Jacketed style.
2. Specify the start point.
3. Specify the endpoint.
4. Specify the endpoint of the next segments.
5. Press ENTER to complete the line.

Command line RSAJACKET

Example of Traced Lines

Example of Jacketed Lines

Chapter 3
Instruments and Functions

Using an Instrument Bubble

P&ID Master provides you with all the ANSI/ISA instrument bubble symbols. The instrument bubble symbols are defined with attributes, this allow for easy editing of the values inside the symbol. You can set the default properties of the instrument bubble using the Preferences.

When you insert an instrument bubble on a drawing, any objects that passes thru or touches the instrument bubble will be broken around the symbol. If the instrument bubble does not touch an object, you are given the option to attach a leader to the instrument bubble.

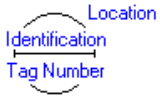
Inserting an instrument bubble

1. Using the P&ID Master pull-down menu choose Instrument. Then choose the type.
2. Specify the insertion point.
3. Specify the rotation angle or point.
4. Enter information for Identification, Tag Number, and Location attributes.
5. If the instrument bubble was not insert on a line, you are prompted on the command line:

   Attach Leader? Yes/<No>:

   Enter **y** or **yes** and press ENTER to draw a leader line from the instrument bubble to a point. Press ENTER not to draw a leader and to complete the instrument bubble.

   Command line RSAIBUB



Example of Instrument Bubble

Instrument Bubble Types and Text Height

There are two types of instrument bubbles, *fixed diameter* and a *custom diameter*. Fixed diameter (1/2" and 9/16" diameter) instrument bubbles do not break around the text type inside the bubble. The text height is fixed at 3/32". This type of bubble gives you the maximum amount of text inside the bubble.

Custom diameter instrument bubbles allows you to define the diameter of the instrument bubble and breaks around the text type inside the bubble. The text height is related to the instrument bubble diameter. The default diameter of 0.4375" has a text height of 3/32". Increasing the instrument bubble diameter will increase the text height. For more information on text heights, see the online *Customization Guide*.

Editing an Instrument Bubble

Once a instrument bubble has been used on a drawing you may need to edit its properties. P&ID Master allows you to modify the attribute values and their justification, and field position.

Modifying an existing instrument bubble

1. Using the P&ID Master pull-down menu choose Edit Properties. From the fly-out menu choose Instrument Bubble.
2. Select the Instrument Bubble to edit.

Command line RSABEDIT

Setting Instrument Bubble Properties

When you insert an instrument bubble on a drawing, P&ID Master assigns several default properties to the instrument bubble. The default properties include, instrument bubble diameter (size), text justification, and maximum number of characters inside the instrument bubble.

You can modify the default properties with the Preferences at anytime without changing the existing instrument bubbles on the drawing, the settings will only effect new instrument bubbles inserted on the drawing.

Instrument and Function Symbols

P&ID Master includes many instrument, interlock and device, and function symbols to use on a drawing. You can access any of the instrument and function symbols by choosing them from the P&ID Master menu.

The size of the instrument and function symbols, when inserted on the drawing, is determined by the default instrument bubble diameter. If you double the instrument bubble diameter, this will cause the symbol to be inserted at twice their previous size. Reducing the diameter will decrease the symbol size. Use the Preferences to change the instrument bubble diameter.

Instrument Menu

From the P&ID Master menu, choose Instrument or from the Tools toolbar, choose 

Instrument Symbols

Discrete Instrument Bubble
Shared Instrument Bubble
Computer Instrument Bubble
Program Instrument Bubble
Pilot Light
Indicating Meter
Diaphragm Seal
Patchboard Point

Function Menu

From the P&ID Master menu, choose Function or from the Tools toolbar, choose 

Function Symbols

Signal Monitor	Derivative	Bias
Summing	Multiplying	High Limiting
Averaging	Dividing	Low Limiting
Difference	Extraction	Convert
Proportional	High Selecting	Plus
Integral	Low Selecting	Minus

Interlock and Device Menu

From the P&ID Master menu, choose Interlock or from the Tools toolbar, choose 

Interlock and Device Symbols

Purge
Reset
Undefined Interlock
And Interlock
Or Interlock
Not Interlock
Large User Defined Interlock
Small User Defined Interlock

Chapter 4
Control Valve Body and Actuators

Using a Control Valve

P&ID Master provides you with all the ANSI/ISA control valve symbols. The control valve symbols are defined with attributes, this allow for easy editing of the values inside the symbol and the valves can be inserted open or closed.

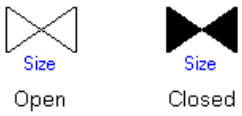
When you insert a control valve on a drawing, any object that passes thru or touches the valve will be broken around the valve. Set the default properties of the control valve using the Preferences.

Inserting a control valve

1. Using the P&ID Master pull-down menu choose Control Valve. Then choose the control valve type.
2. Enter **o** and press ENTER, or press ENTER to draw a open valve.
3. Enter **c** or closed and press ENTER to draw a closed valve.
4. Specify the insertion point.
5. Specify the rotation angle or point.
6. Enter information for Size and Tag Number attributes.

Command line RSAVALVE

NOTE Tag Number attribute is invisible.



Example of Valves

Control Valve Text Height

The control valve text height is directly related to the size of the valve. The control valve default size of 1/4" has a text height of 3/32". Increasing the control valve size will increase the text height. For more information on text heights, see the online *Customization Guide*.

Editing a Control Valve

Once a control valve has been used on a drawing you may need to change the open/closed status or attribute values of the valve. P&ID Master allows you to change the valve's open/closed status simply by selecting the valve. You should use the AutoCAD DDATTE command to edit the control valve attributes.

Modifying an existing control valve

1. Using the P&ID Master pull-down menu choose Edit Properties. From the fly-out menu choose Control Valve.
2. Select a valve, this will toggle it's current open/closed status. If the valve is open it will be changed to closed, if the valve is closed it will be changed to open.

Command line RSAVEDIT

Setting Control Valve Properties

When you insert a control valve on a drawing it can be open or closed, P&ID Master will use the default control valve size to automatically scale the valve for you during insertion.

You can set the default control valve size and open/closed status with the Preferences at anytime without changing the existing control valves on the drawing, the settings will only effect new control valves inserted on the drawing.

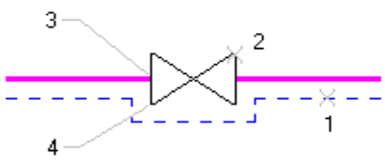
Creating Trace Lines Around a Control Valve

When a control valve is inserted on a traced linetype you may want the trace line to go around the control valve, P&ID Master can help you with this task. You can reroute the trace line around the control valve with just a few simple picks.

Tracing around a control valve

1. Using the P&ID Master pull-down menu choose Control Valve. Then choose Trace Around Valve.
2. Select the trace line (1).
3. Select the valve to trace around (2).
4. Specify endpoint (3) of the line that touches valve.
5. Specify endpoint (4) of the outer most side of valve.

Command line RSAVTRACE

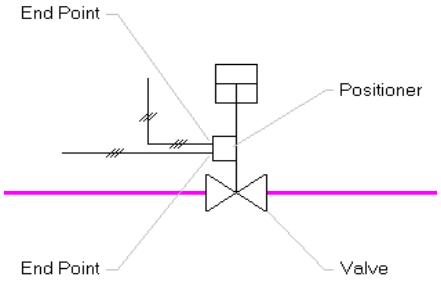


Using Actuators

P&ID Master provides you with all the ANSI/ISA actuator symbols. Actuators are normally used in conjunction with control valves, if during insertion of a actuator you choose a control valve for its insertion point, the actuator will automatically be rotated to the same angle of the control valve symbol.

The size an actuator is inserted on the drawing is determined by the setting of the default control valve size. If you double the control valve size, this will cause the actuator to be inserted at twice its previous size. Reducing the size will decrease the actuator size. Use the Preferences to change the control valve size.

If the actuator contains a positioner, you may attach lines to the supplied endpoints in the positioner. The positioner is created with three (3) line segments so that you can use the ENDpoint OSNAP mode to select the area to attach. If you need to attach to the middle of the positioner use the MIDpoint OSNAP mode and select the middle of the positioner.



Control Valve Body and Actuator Symbols

P&ID Master contains many other related symbols included with the control valve body and actuators libraries. You can access any of these symbols thru the P&ID Master menu.

The size of these symbols, when inserted on the drawing, is determined by the setting of the default control valve size. If you double the control valve size, this will cause any of these symbols to be inserted at twice its previous size. Reducing the control valve size will decrease the its size. Use the Preferences to change the control valve size.

Control Valve Body Menu

From the P&ID Master menu, choose Control Valve or from the Tools toolbar, choose 

Control Valve Body Symbols

Gate Valve	Quick Opening Valve	Rotary Valve
Ball Valve	Angle Valve	Restriction Orifice
Globe Valve	3-Way Valve	Directional Arrows
Needle Valve	4-Way Valve	Valve Arrows
Butterfly Valve	Slide Valve	Fail Safe Arrows
Diaphragm Valve	Check Valve	Valve Jackets
Plug Valve	Rotating Disk Valve	Dampers

Actuator Menu

From the P&ID Master menu, choose Actuator or from the Tools toolbar, choose 

Actuator Symbols

Diaphragm	Solenoid	Electrohydraulic
Cylinder	Handwheel	Valve Fail Indeterminate
Regulator	Pressure Relief	Valve Fail Locked
Digital	Rotary Motor	Well
Motor		

Chapter 5
Tags

Tag Symbols

P&ID Master provides tag symbols for referencing continuation of a line to another drawing, line information, identifying components, indicating flow direction, and tags that call attention to detail. The tags are designed to accommodate most styles and text orientation requirements and you can access all of these symbols thru the P&ID Master menu.

Tags are inserted full size on the drawing and are defined with attributes. You can use the AutoCAD DDATTE command to edit the tag attributes after the symbol has been inserted on the drawing.

Tag Menu

From the P&ID Master menu, choose Tag or from the Tools toolbar, choose 

Tag Symbols

Line Tag	Line Break Arrow
Multi Text Line Tag	Other Sheet Arrow
Continuation Tag	Tie-in Arrow
Reference Flag	Slope
Line Number Tag	Grade
Symbol Tag	

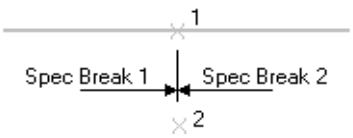
Material Specification Break

Many times on a drawing it is necessary to designated the material type for a line and the start or ending point of that material, P&ID Master can help you with this task.

Creating a material specification break

1. Using the P&ID Master pull-down menu choose Tag. Then choose specification break type.
2. For length of the specification break line enter **s** or **short**, **m** or **medium**, **l** or **long**, **d** or **define** and press ENTER, or press ENTER for the default length. Define allows you enter a specify length for the specification break line.
3. Specify a starting point (1) for the specification break line.
4. Specify a point (2) for the direction of the specification break line, or enter **l** or **line** and press ENTER to choose a line that the specification break line will be perpendicular to.
5. Enter attribute information.

Command line RSASPEC



Chapter 6
Elements, Fittings and Miscellaneous

Elements, Fittings and Miscellaneous Symbols

P&ID Master provides the means to create primary elements, many types of fittings and other usefully symbols. You can access any of these symbols thru the P&ID Master menu.

The size of the element and fitting symbols, when inserted on the drawing, is determined by the setting of the default control valve size. If you double the control valve size, this will cause any of these symbols to be inserted at twice its previous size. Reducing the control valve size will decrease the its size. Use the Preferences to change the control valve size. The miscellaneous symbols are inserted at full scale on the drawing.

Element Menu

From the P&ID Master menu, choose Element or from the Tools toolbar, choose 

Element Symbols

Trap	Positive Displace Indicator
Magnetic Flowmeter	Turbine
Sonic Flowmeter	Rupture Disk Press Relief
Vortex Sensor	Rupture Disk Vacuum Relief
Target Sensor	Flow Straightening Vane
Single Port Pilot	Weir
Tube	Venturi Tube
Averaging Pilot Tube	Flow Nozzle
Flame Arrestor	Flume

Fitting Menu

From the P&ID Master menu, choose Fitting or from the Tools toolbar, choose 

Fitting Symbols

Restriction Orifice	Valve Flanges
Flange no Orifice	Concentric Reducer
Quick Change Fitting	Eccentric Reducer
Y-Type Strainer	Pipe Cap
Paddle Blind	Quick Hose Connection
Spectacle Blind	Pipe Elbow

Miscellaneous Menu

From the P&ID Master menu, choose Miscellaneous or from the Tools toolbar, choose 

Miscellaneous Symbols

Spot Drain
Roof Vent
Ground
Blank Insulation
Electric Trace Insulation
Steam Trace Insulation

Chapter 7
Equipment

Equipment Symbols

P&ID Master includes a wide variety of equipment symbols to use on a drawing. You can access any of the equipment symbols by choosing them from the P&ID Master menu.

The size of the equipment symbols, when inserted on the drawing, is determined by the default equipment scale factor. If you double the equipment scale factor, this will cause the symbol to be inserted at twice their previous size. Reducing the scale factor will decrease the size. Use the Preferences to change the equipment scale factor.

Some of the equipment symbols have attributes defined within the symbol. You will be prompted for the attribute information when you insert the symbol on the drawing. Use the AutoCAD DDATTE command to edit the attributes after the symbol has been inserted on the drawing.

Tank and Vessel Menu

From the P&ID Master menu, choose Equipment, then choose Tank/Vessel or from the Tools toolbar, choose 

Tank and Vessel Symbols

- Tanks
- Half Pipe Jacketed Tank
- Full Jacketed Tank
- Vessels
- Columns
- Coil
- Flat Coil
- Dip Leg
- U-Tube

Pump and Blower Menu

From the P&ID Master menu, choose Equipment, then choose Pump/Blower or from the Tools toolbar, choose 

Pump and Blower Symbols

- Centrifugal
- Metering
- Screw-Type
- Centrifugal In-Line
- Sump Submersible
- Sump Extended Shaft
- Positive Displacement Blower
- Centrifugal Blower
- Rotary Screw Compressor

Material Handling Menu

From the P&ID Master menu, choose Equipment, then choose Material Handling or from the Tools toolbar, choose 

Material Handling Symbols

Structure
Cyclone
Bag House
Drum
Belt Conveyor
Vibratory Conveyor
Screw Feeder Conveyor
Propeller Agitator
Paddle Agitator
Turbine Agitator
Helix Agitator

Heat Exchanger and Motor Menu

From the P&ID Master menu, choose Equipment, then choose Heat/Motor or from the Tools toolbar, choose 

Heat Exchanger and Motor Symbols

U-Tube Exchanger
Shell & Tube Exchanger
Hairpin Exchanger
Motor
Turbine Motor
Electric Motor
Gas/Diesel Motor
Hydraulic Motor
Air Motor
Steam Motor
User Define Motor

Miscellaneous Equipment Menu

From the P&ID Master menu, choose Equipment, then choose Miscellaneous or from the Tools toolbar, choose 

Miscellaneous Equipment Symbols

Manway Nozzle
Flanged Nozzle
Welded Nozzle
Threaded Nozzle
Insulation
Equipment Tag

Equipment Filter

You may need to create a hatch pattern that represents a filter for a piece of equipment on the drawing. P&ID Master can help you create the equipment filter with just a few simple picks.

Creating an equipment filter

1. Using the P&ID Master pull-down menu choose Equipment. From the fly-out menu choose Equipment Filter.
2. If you designate a From point, you will continue to be prompted for the Next point. Each point is connected to form a side of the boundary.
3. Press ENTER to end the command.

Command line RSAFILTER

NOTE The equipment filter will fill the boundary area you define. You must specify at least three point.

Setting Equipment Properties

When you insert an equipment symbol or equipment filter on a drawing, P&ID Master assigns several default properties to the symbol or filter. The default properties include, scale factor (size), layer, and hatch pattern for the equipment filter only.

You can modify the default properties with the Preferences at anytime without changing the existing equipment symbols and equipment filters on the drawing, the settings will only effect new equipment symbols and equipment filters inserted on the drawing.

Chapter 8
Controlling Default Settings and Layers

Setting Preferences

P&ID Master allows you to customize the default properties for layers, instrument bubbles, control valves, equipment, linetypes, and the user interface. The default properties are used to control how objects are created on the drawing and how you access them, use the Preferences to change these settings.

You can use the Preferences to change the size a symbol is created on the drawing. This is usefully if you need various sizes of instrument bubbles, control valves, equipment, and other symbols. Take for example the instrument bubble diameter, this value controls how large the diameter of the instrument bubble will be when inserted on the drawing. If you double the diameter, this will cause the instrument bubble to inserted at twice its' previous size. Reducing the diameter will decrease the size.

NOTE When you change the default properties of an object, it does not effect the existing objects on the drawing. Only new objects created after the change will be effected.

Layer Management

P&ID Master and ToolChest will help you manage the layer names and their properties that objects (i.e., instrument bubble, control valve) are created on. At anytime you can change the layer that is associated with an object.

With the Preferences, you can control whether objects are created on their *default layer* or *existing layer*. Use a combination of both the default and existing layers to communicate your design. Here are a few suggestions that these layers can be used for.

Default layer can designate that objects are...

- to be installed on a project
- part of the existing process

Existing layer can designate that objects are...

- already installed
- to be removed
- to be abandoned

The actual layer name that the P&ID Master object uses is controlled by the Preferences. This command provides an easy to use interface that allows you to specify which layer name is associate with an object. This association is what controls the layer that an object will be created on the drawing. The layers that will be available to choose from are define in a *layer template*.

A *layer template* is used to define the layer names and their properties that will be used on the drawing. The *pid.lay* file is the default P&ID Master layer template, this file is located in the ToolChest common folder (i.e., *C:\Rsa..\Com*). You edit a layer template with the ToolChest Layer Template Editor. Access this command from the ToolChest pull-down menu, first choose Layer Utilities, then from the fly-out menu choose Template Editor. You can also enter RSALTED on the AutoCAD command line and press ENTER.

Several other style layer templates are provided that can be used with P&ID Master. These layer templates are good examples on how you can customized the P&ID Master layer structure to suit your needs.

Layer Template Table

Location	File name	Description
\Com	pid.lay	Default layer template
\Com	pidcomplex.lay	Uses the Standard style linetypes
\Com	pidclassic.lay	Uses the Classic style linetypes
\Com	pidshort.lay	Minimum number of layers

NOTE When you change the layer that is associated with an object, it does not effect the existing objects on the drawing. Only new objects created after the change will be placed on the new layer name.

Rebuild Default Layer Properties

P&ID Master provides a quick and convenient ways to rebuild the default layers properties in your drawing or to update a drawing to reflect a specific layer template. Rebuilding layers will update or create any number of layers names and their properties in the current drawing.

NOTE If a layer in the layer template references a linetype that is not defined in the default linetype file (*acad.lin*), it may not completely rebuild all layers in the layer template. To resolve this problem validate that all linetypes that are in the layer template are defined in the default linetype file (*acad.lin*) or loaded in the current drawing.

Rebuild default layers

1. Using the P&ID Master pull-down menu choose Rebuild Layers.
2. The current layer names will be verified in drawing before continuing. Layers are modified or created as needed. You are prompted that a regeneration of the drawing may be necessary to update the display.

NOTE You can change the default layer template that is used to rebuild the layer names by using the Preferences. Under the Layer area, select the Layers button.

Chapter 9
Accessing the Drawing Database

Configuring the Database

P&ID Master allows you to extract the information stored in a drawing database. With the P&ID Master default setup you can retrieve instrument bubble tag names, control valve tag names and sizes, line numbers and more. This information is contained in attributes of blocks inserted on the drawing. The information can be previewed online or reports created to print and edit with your favorite word processor. If you have existing drawings not created with P&ID Master, it may not be possible to use the database program without editing those drawings first or customizing the database categories.

Every drawing that you create with P&ID Master is built upon a library of blocks that has intelligence. Each P&ID Master block contain attribute tags, you may assign a value to each attribute in a block when it is used on a drawing. These attribute values are used to create specific reports and listings of the objects in a drawing.

NOTE If you change a blocks attribute value after a report is generated on a drawing, you must create the report again to reflect any changes made to the drawing.

Database Category

P&ID Master separates the drawing database into categories. Each category is designed to contain similar type objects (i.e., instrument bubble tag names, control valve tag names...). You can define which blocks are included in a category and what attribute tag names of each block are used in the report. You can also configure how the attribute values are displayed in the report.

Setup a category

1. Using the P&ID Master pull-down menu choose Database.
2. Under Index, choose Setup.
3. Choose the category name to modify.
4. You can add, modify, and delete block names.
5. Pick OK to save changes.

Command line RSAPIDDB

Using Existing Drawings

The P&ID Master database program uses block names that are defined in categories to generate reports. By default the category settings only include block names that come with P&ID Master. Since your block names are not likely to be the same as the P&ID Master block names, your blocks and their values will not show up in the reports.

There are two ways to resolve this problem, You can either replace all your existing blocks on the drawing with P&ID Master blocks, or add your own block names to a database category. When you add a block name to a category make sure to use the correct attribute tag names when defining the block fields.

Index Reports

Use the P&ID Master database program RSAPIDDB to generate index reports on your drawing. A report may contain the information based on just one database category or be based upon multiple database categories.

When a index report is first generated it will be displayed online, once it is displayed you can then print or edit the report. When you print or edit a report, you can have it include your company information, the drawing file name, and date the report was created. The reports that P&ID Master creates are ASCII text file (*.txt*), the text file name defaults to the name of the drawing. When you print or edit a report, it is done with an ASCII text editor. The default text editor is Windows *Notepad.exe* program.

Create an Index Report

1. Open the drawing that you want to be included in the index report.
2. Using the P&ID Master pull-down menu choose Database.
3. From the Category list box, select the category names to include in the report.
4. Under Index, select Create.

Print and Edit an Index Report

1. Open the drawing that you want to be included in the index report.
2. Using the P&ID Master pull-down menu choose Database.
3. From the Category list box, select the category names to include in the report.
4. Under Index, select Create.
5. Choose Print/Edit.
6. You may accept the default file name for the index report or assign a different name.
7. Choose OK.

NOTE The default text editor will display the index report file. Use the text editor to print and edit the file.

Change Company Information on Reports

1. Open the drawing that you want to be included in the index report.
2. Using the P&ID Master pull-down menu choose Database.
3. From the Category list box, select the category names to include in the report.
4. Under Index, select Create.
5. Choose Print/Edit.
6. Choose Edit Company. The default text editor will display the index report header file (*Rsapiddbhd.txt*).
7. Use the text editor to edit the file.
8. Save the file and exit the text editor program.
9. Choose OK or Cancel.

Change the Default Text Editor

1. Open the drawing that you want to be included in the index report.
2. Using the P&ID Master pull-down menu choose Database.
3. From the Category list box, select the category names to include in the report.
4. Under Index, select Create.
5. Choose Print/Edit.
6. Choose Editor.
7. Select the ASCII text editor program file name (*.exe*).
8. Choose OK.

Extracting Attribute Information

P&ID Master allows you to extract attribute information from a drawing and create a separate text file for use with other database software. The attribute information is put in the form of an extraction file (*.txt*) or drawing interchange file (*.dxf*). A *template file* is used to structure the text file to contain the extracted attribute information.

Extracting attribute information from drawing

1. Using the P&ID Master pull-down menu choose Database.
2. Under Attribute Extraction, choose Extract.
3. Choose a category name.
4. Select a file format.
5. You may accept the default file name or assign a different name.
6. Choose OK.

Command line RSAPIDDB

NOTE Extracting attribute information does not affect the drawing.

Template File

P&ID Master provides predefined template files that contain all the information associated with its attribute tags, such as instrument bubbles, control valves, equipment, line tags, and symbol tags. These files are used to determine what attribute information to extract from the drawing.

All P&ID Master template files may be modified to suit your needs, be aware that doing so will alter the attribute information extracted from the drawing. These files are located in the P&ID Master root folder (i.e., *C:\Rsa...\Pid*). For more information on creating template files see the AutoCAD manuals.

Attribute Tag Template Table

Category	Template File name
Control Valve	rsaattvalve.txt
Equipment	rsaattequip.txt
Instrument	rsaattinstru.txt
Line Tag	rsaattline.txt
Symbol Tag	rsaattsymbol.txt

Index