Valve Condition Monitoring Unit

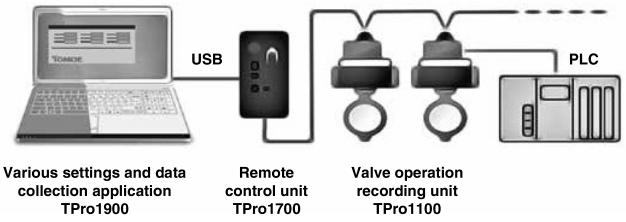
Tom Probe Series

The Tom Probe Series consists of new devices which record the operational status of quarter-turn valves automatically, 24 hours a day, 365 days a year. The unit quickly detects abnormalities and defects in the valves, and notifies these externally, via various interfaces.
The Tom Probe Series can perform a partial stroke test. The units also have a new function, the ASF (Active Safety Function), which performs partial stroke tests periodically based on the calendar in the TPro1100.

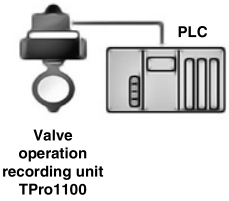
The unit supports the whole range of applications, from status monitoring to maintenance work in general.
The unit manages centrally the data required for valve maintenance work.
The support contents can be selected as necessary.

(1) Total support
Valve operational status is uploaded to the cloud server, and the status can be checked from anywhere.
Email notification of an alarm occurrence is also available.

(2) Remote status monitoring
The status of valves in a remote location, such as a plant, can be monitored remotely via a PC.



(3) Data collection
Valve status data required for maintenance can be stored in the TPro1100, and the data can be transferred to a PC as necessary.
The unit can easily be installed to an existing valve, and can be used as a data logger immediately.



TPro1100 <Unit main body>

Operation recording unit for quarter-turn valves.
The unit records the operation of a valve driven by an air cylinder, 24 hours a day, 365 days a year.
The unit records the valve operational data continuously and sends the data to other devices.
The unit can perform a partial stroke test (PST). The unit also has a new function, ASF (Active Safety Function), which performs a partial stroke test automatically, based on the calendar in the TPro1100.

TPro1700 <Remote control unit>

A remote control unit providing centralized control and status display of the TPro1100.
A maximum of 15 TPro1100 units in a dedicated communication network can be controlled.
The unit has a function for creating a communication network, connecting the TPro1100 to a PC with the data collection application TPro1900 installed.

TPro1900 <Application>

A freeware program which allows configuration of various settings and data collection for the TPro1100 via a PC.
Through the dedicated communication network, the application allows checking of open/close status, trend evaluation results, lists partial stroke test results for a maximum of 15 TPro1100 units, and saves the operational data from the TPro1100 to a PC.
The application also has the "Angle profile" function, which retrieves and displays the motion of the disc during valve operation in real time.

Tom Probe Connect <Cloud service>

Valve operational data collected by the TPro1900 is uploaded to a cloud server through the Internet.
The data is accumulated on the cloud server, which allows a check of the valve status from anywhere at any time.
The operational data history including valve opening/closing is visualized, and a variety of device errors can be checked from anywhere.

TPro1100 <Unit main body> Quarter-turn valve operation starting unit

Features

Operation and Setting Mode

Control recording	Operation mode for recording the open/close control of a valve and the operational status of a valve in order to perform open/close control and various tests
Data logger	Operation mode for recording the operational status of a valve which is controlled by devices other than this unit
Setting	Mode for creating settings for various kinds of operation recording

Power Supply Specifications

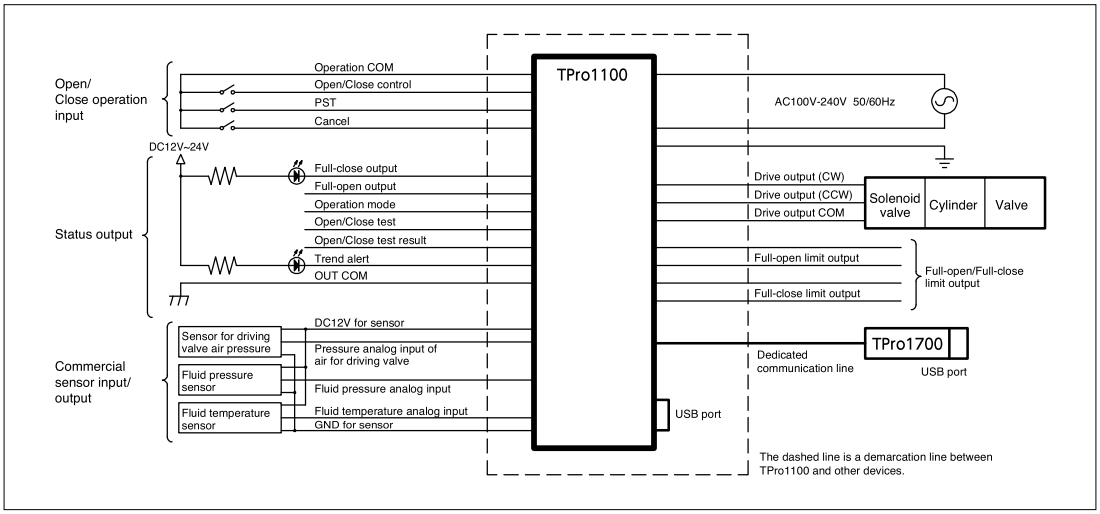
Input power supply is AC100-240V, 50Hz/60Hz. The unit can be used in many overseas countries.

Status Output

The unit outputs open/close status, operation mode, abnormal status, etc. of a unit to be monitored to external control devices, such as sequencers. The status of the devices can be transmitted in detail by altering settings on the main body.

Full-close output	Full-open output	Operation mode output	Open/Close test output	Open/Close test result output	Trend alert output

Various Control and Output Interfaces



Error Notification

The unit continuously records the operational status of the valve. If any abnormal value is detected, the unit provides notification of the abnormality through external output or communication.

Test Items

Open/Close +50% over error
Open/Close -50% over error
Open/Close + over error
Open/Close - over error
TA open time over
TA close time over
PST/ASF not reached set angle
PST/ASF timeout

Data Save Mode

8000 or more units of data can be saved. Values including opening/closing time, and values of commercial sensors (up to three) can be recorded. The unit has three recording modes for various tests.

Continuous Mode	When the memory is full, the oldest data is overwritten by new data.
One Shot Mode	When the memory is full, recording stops.
Accumulation Mode	When the memory is full, old data is reduced, and new data is saved. This is an original recording system where new data is accumulated while old data is kept.

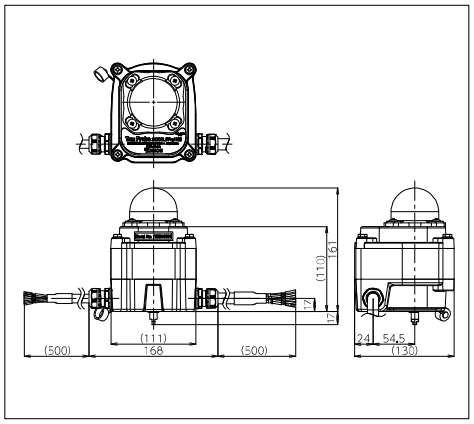
Valve Partial Stroke Test Function

Partial stroke test (PST) is a test method to check the operational status by opening and closing a valve a little. The test can be performed by combining a solenoid valve for driving a cylinder with the TPro1100.
Additionally, the ASF (Active Safety Function) which performs the partial stroke test automatically based on the calendar in the TPro1100 is inbuilt. The opening/closing test interval can be selected as every day, every week, or every month.

■Product Specifications

Attachment shape	VDI ／ VDE3845 Rotary Actuators (Quarter-turn) and Auxiliary Equipment
Dust-proof and waterproof	IP65 equivalent
Conduit tube connection	500 mm length for both power supply cable and communication cable
Main material of body	Aluminum die-casting
Display function	Open/Close indicator
Power supply voltage	AC100V-AC240V　Single-phase　50/60Hz
Ambient operating temperature	-20℃ to 80℃ (No condensation)
Ambient storage temperature	-20℃ to 80℃ (No condensation)
Interface specifications	◆ I/O contact input/output (Open/close instruction, PST instruction, status output) ◆ Analog input (3 points for sensors) ◆ TOMOE's dedicated communication (RS485)
Functions	◆ Direct drive function of solenoid valve ◆ PST function (One mode out of 13 modes is selected.) ◆ ASF function (One mode out of 13 modes is selected.) ◆ Trend data logging function (8000 data for each Open, Close, PST and ASF are held in the main body.)

■External Dimensions



TPro1700 <Remote control unit/Option>

Achieving Centralized Control and Status Display

Features

Relay Function

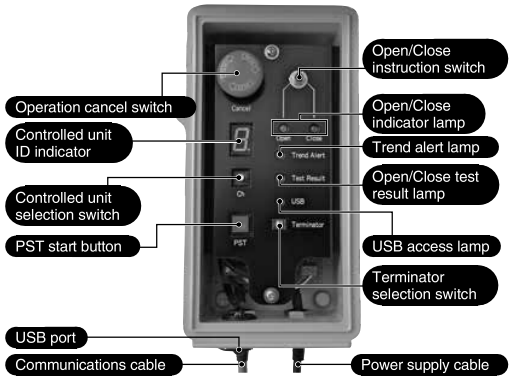
The unit has a function for creating a communication network, connecting the TPro1100 main body unit to a PC with the TPro1900 application installed. A maximum of 15 TPro1100 units can be controlled.

Saving on Wiring

Installation requires only two communications cables and a power supply cable to the unit.

Reduced Installation Costs

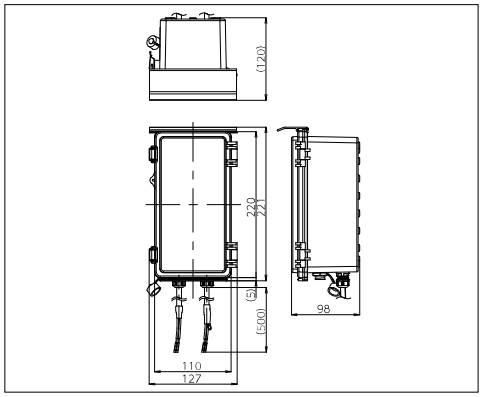
Since the unit is equipped with control switches and LED status display lamps, no separate control board is required.



■Product Specifications

Attachment shape	Attachment with various stays
Dust-proof and waterproof	IP65 equivalent
Conduit tube connection	500 mm length for both power supply cable and communication cable
Main material of body	Main body: ABS resin
Display function	LED open/close indication, power indicator lamp, test result indication, controlled unit ID 7-segment indication
Power supply voltage	AC100V-AC240V　Single-phase　50/60Hz
Ambient operating temperature	-20℃ to 50℃ (No condensation)
Ambient storage temperature	-20℃ to 60℃ (No condensation)
Interface specifications	◆ Switch input (Open/close instruction, PST instruction) ◆ Compliance with USB standards ◆ TOMOE's dedicated communication (RS485)
Functions	◆ Communication gateway function (USB-RS485) ◆ Operation instruction to a selected unit

■External Dimensions



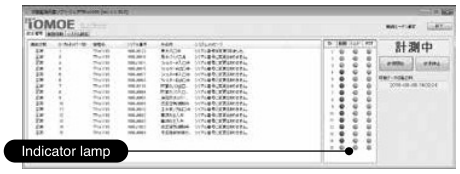
TPro1900 <Application>

Various Settings and Data Collection Controlled with a PC

Features

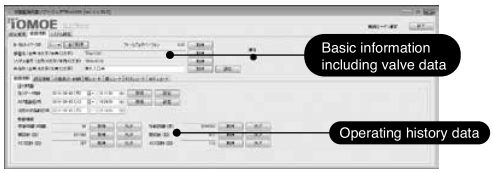
Integrated Management Function

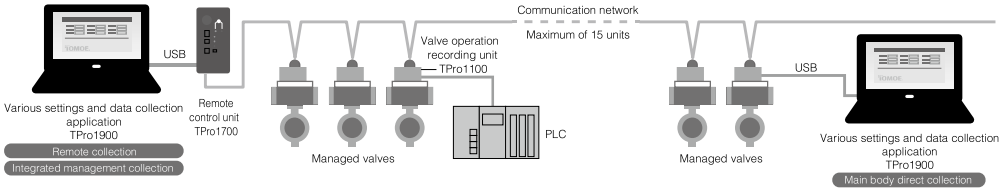
The application displays information from all TPro1100 units in the network in a list form. The indicator lamps on the screen also allow checking of open/close status, trend evaluation results, and open/close test results for the managed valves.



Device Information

Valve name, date and time in the main body, etc. are settable. Additional information is also available, including total operating time and the number of openings/closings, which is required for planning maintenance.





Setting Information

Checks can be made on good-status standard values learned by the TPro1100, and various settings. Conditions can be configured for the partial stroke test and the adhesion prevention test. In addition, it is easy to check at a glance the TPro1100 status and settings, such as the presence of the sensor connected to the TPro1100, data accumulation mode, detail of outputs to external devices, easily preventing incorrect settings being used.

Remote Data Collection

The valve operation data accumulated in the TPro1100 can be collected from a remote location when used in conjunction with the TPro1700 (Remote control unit/Option). The status of valves located in difficult-to-access areas can be tracked easily.

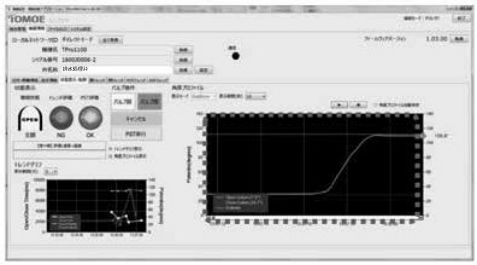
Trend Data Collection

The trend data accumulated by the TPro1100 can be collected in three ways.

Main body direct collection	Data is collected directly through the USB port on the TPro1100.
Remote collection	Data from any designated TPro1100 in the communication network is collected via TPro1700.
Integrated management collection	Data from each TPro1100 in the communication network is collected via TPro1700.

"Angle Profile" Function

- Function for real-time retrieval and display of disc motions during valve operation.
- The retrieved information can be displayed in graph form and the data can be saved.
  - Valve motion during operation can be checked.
  - Motion can be displayed in graph form in real time.
    -Y-axis: Angle / X-axis: Time
    -You can scroll or cease scrolling freely.
  - Sharing the valve operational data
    -Data can be saved in a CSV format.
    -Data can be saved manually at any time. When operation is detected, the data can be saved automatically also.



Display disc motions in real time

Tom Probe Connect <Cloud service>

Centralized management of valve information on website

Features

High-precision Monitoring System

Data is accumulated on a cloud server.
Comparison with past operational data is available.

No need for continuous monitoring

The e-mail error notification system notifies you of valve operation problems.
Thus, continuous monitoring of equipment by personnel on-site is not necessary.

Checks available at any time

Valve status can be checked from anywhere, at any time, because data is accumulated on the Internet.
This enables you to obtain advice from experienced personnel in remote locations. You can also use the cloud service as a tool to check the past problem history on-site at inspection.

Ease of introduction

Thanks to a cloud server, the initial investment is small and server management is not required.
In comparison with a software purchase, service is more easily available because you need only sign up for the necessary service period. In addition, the web application is updated with the latest functions.
Preventive maintenance has been attracting attention as the latest maintenance method. If preventive maintenance is preferred, "CBM*" can be started with minimum investment.
*CBR (Condition Based Maintenance) = "CBM" is a preventive maintenance method: "Maintenance (such as routine device replacement) is not performed while equipment is operating stably, but only when maintenance is judged to be required."

Communication tool

It has a function to manage a series of information necessary to support the product life cycle, such as inspection, arrangement of repair parts, and maintenance. By utilizing this tool, it is possible to keep a communication record with all parties concerned such as valve operation and maintenance.

Security

In order to provide users with safe access to the Tom Probe Connect site, the system uses TLS1.2, which is the global standard for internet encryption communication systems. Use of TLS1.2 is also strongly recommended in global security standards (PCI DSS) in the credit card industry. This cloud service uses data centers in Japan which are fully secured.

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