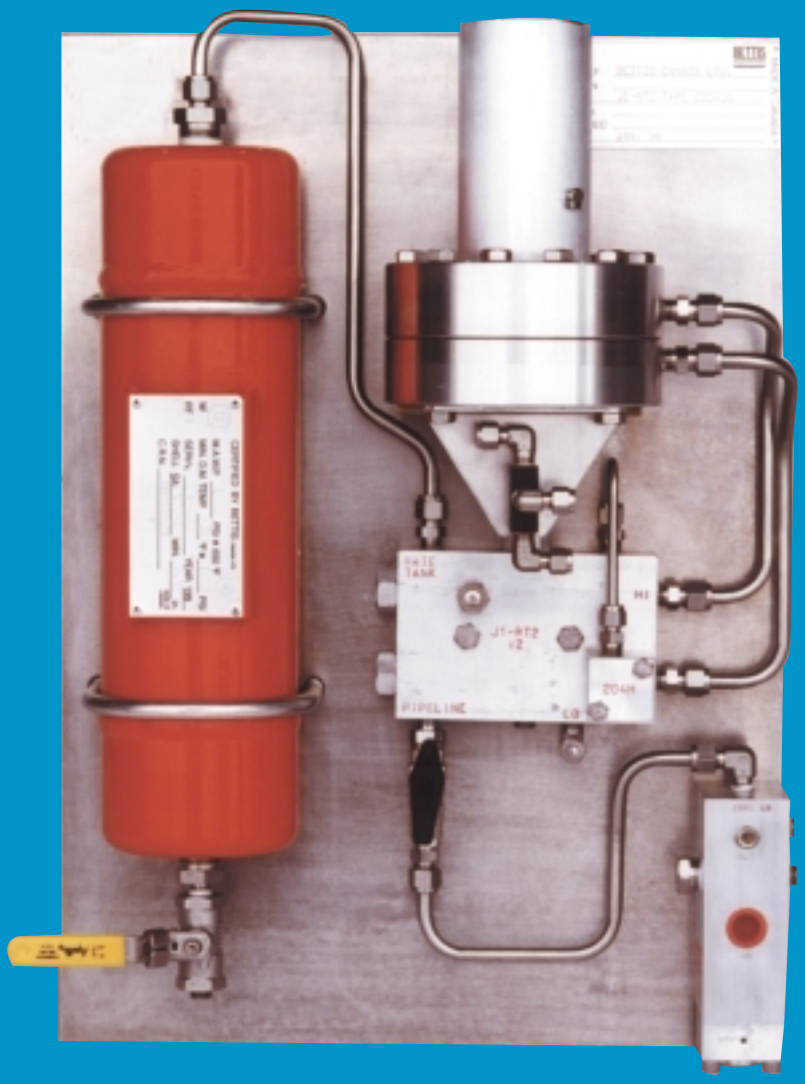
Pipeline Pressure Operated

Selective Shutdown Capability

Compact System



Adaptable to Existing System

Field Adjustable

Withstands Harsh Environment

BETTIS™

DeltaMatic™ Rate of Drop Linebreak Detection System

EMERSON™
Process Management

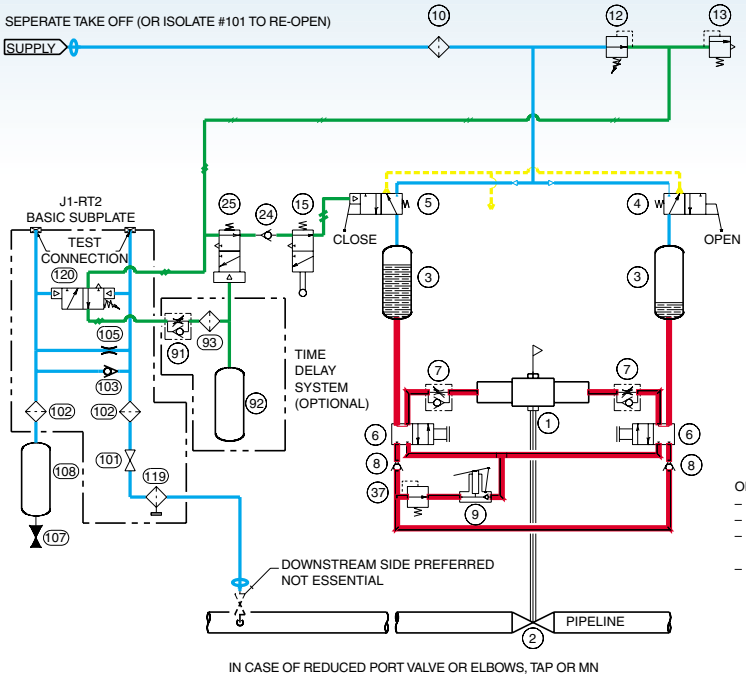
General Description

The Bettis DeltaMatic™ linebreak detection system is designed to automatically monitor a gas pipeline and send an instrument pressure signal if a predetermined rate of pressure drop is exceeded. The system is typically used to detect a pipeline break situation and signal a valve operator. This automatic shutdown function provides safety and environmental protection in populated areas, river crossings, remote areas and other locations.

Features and Benefits

- Works on pipeline pressure, no electrical power required
- Allows normal pipeline pressure fluctuations without shutdown
- Compact and assembled as a complete unit
- Can be retrofitted into an existing system with minimal field hook–up
- Can be installed remote from or directly on valve operator
- Uses a labyrinth type flow restriction (restrictor) providing a large passage size compared to an equivalent orifice or metering valve
- Standard rate of drop ranges down to 5 and up to 120 psi/minute
- Rate of drop setting can be easily field adjusted
- Functions in extreme cold environment to –50°F [–46°C]

Application with Gas/Hydraulic Operator



LEGEND

- POWER GAS
- HYDRAULIC
- ELECTRICAL
- FIELD CONNECTION
- PLUGGED PORT
- SIGNAL
- RETURN
- VENT
- CLOSED
- OPEN

LIST OF COMPONENTS

1	OPERATOR
2	LINE VALVE
3	GAS/HYDRAULIC TANK
4	3-WAY VALVE, MANUAL
5	3-WAY VALVE, MANUAL/PILOT
6	SELECTOR VALVE
7	SPEED CONTROL VALVE
8	CHECK VALVE
9	HANDPUMP
10	FILTER
12	PRESSURE REGULATOR
13	RELIEF VALVE
15	END OF STROKE VALVE
24	CHECK VALVE
25	REVERSING RELAY
37	HANDPUMP SAFETY VALVE
91	ORIFICE, TIME DELAY (OPTIONAL)
92	TANK, TIME DELAY (OPTIONAL)
93	FILTER (OPTIONAL)
101	PIPELINE ISOLATION VALVE
102	FILTER
103	CHECK VALVE
105	RESTRICTOR
107	TANK DRAIN VALVE
108	RATE TANK
119	PRE-FILTER
120	DIFFERENTIAL PRESSURE PILOT

OPERATION

- SHOWN WITH LINE VALVE OPEN
- LINE VALVE WOULD CLOSE WITH POWER GAS PRESENT
- LINE PRESSURE IS APPLIED TO DIFFERNTIAL PRESSURE PILOT (120) AND TO RATE TANK (108) THRU CHECK VALVE (103).
- THE DIFFERENTIAL PRESSURE PILOT (120) COMPARES LINE PRESSURE WITH REFERENCE PRESSURE IN RATE TANK (108). IF LINE PRESSURE DECREASES, A DIFFERENTIAL PRESSURE IS CREATED BETWEEN RATE TANK AND LINE ACROSS RESTRICTOR (105). THIS DIFFERENTIAL PRESSURE, MEASURED BY THE DIFFERENTIAL PRESSURE PILOT, IS A FUNCTION OF RATE TANK SIZE, RESTRICTOR SIZE, AND RATE OF DROP OF LINE PRESSURE. WITH THE RATE TANK SIZE BEING FIXED, AND RESTRICTOR SIZED FOR A GIVEN APPLICATION, THIS DIFFERENTIAL PRESSURE IS DIRECTLY RELATED TO RATE OF DROP OF LINE PRESSURE. THE DIFFERENTIAL PRESSURE PILOT IS CALIBRATED TO VENT A SIGNAL FROM THE VALVE OPERATOR CONTROL WHEN THE RATE OF DROP EXCEEDS A PREDETERMINED SETTING.

Typical System Calibration

A restrictor size is selected at the factory, based on a specified rate of drop range and pipeline pressure range.

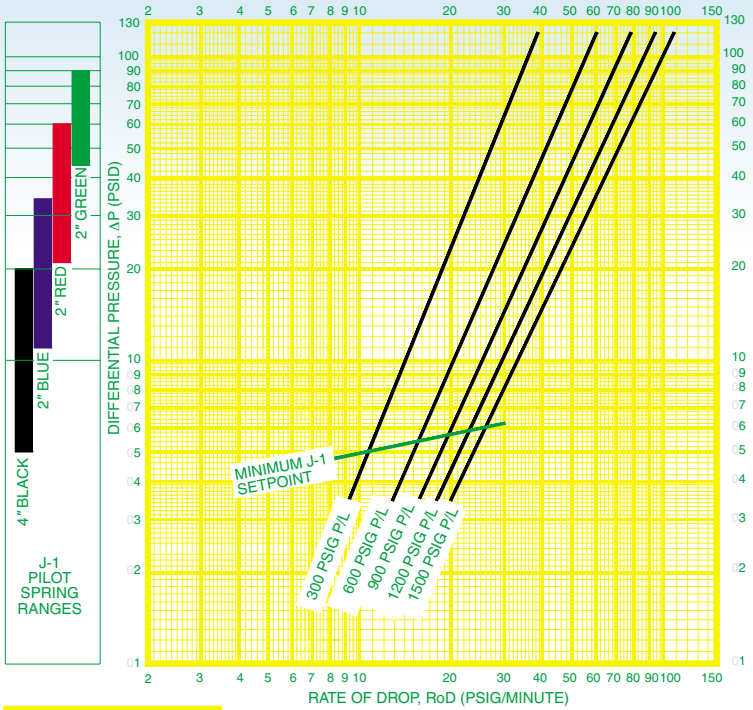
The calibration chart for the selected restrictor (example at right) is used the find the differential pressure (ΔP) corresponding to a specific rate of drop and pipeline pressure.

Example: If the rate of drop to be detected is 20 psi/min and pipeline pressure is 600 psig, then the corresponding ΔP is 26 psig (as shown).

The DeltaMatic pilot is then set to trip at this ΔP by selecting a spring and adjusting the setpoint.

The rate of drop setting of the system can be changed by adjusting the DeltaMatic pilot to a different ΔP. This may require selecting a different spring, which may be changed and recalibrated in the field.

If the required rate of drop range should change or be revised by the user, the DeltaMatic unit can be converted to a different nominal range in the field by fitting a different restrictor. (Table A).



LEGEND	
P/L	PIPELINE PRESSURE
RoD	RATE OF PRESSURE PIPELINE PRESSURE
ΔP	DIFFERENTIAL PRESSURE ACROSS J-1 PILOT
SG	SPECIFIC GRAVITY

THIS CHART SHOWS RoD AND ΔP FOR NATURAL GAS, SG = 0.67
FOR AIR, SHIFT THE LINES TO THE LEFT USING:
(RoD, AIR) = 0.85 X (RoD, NATURAL GAS)

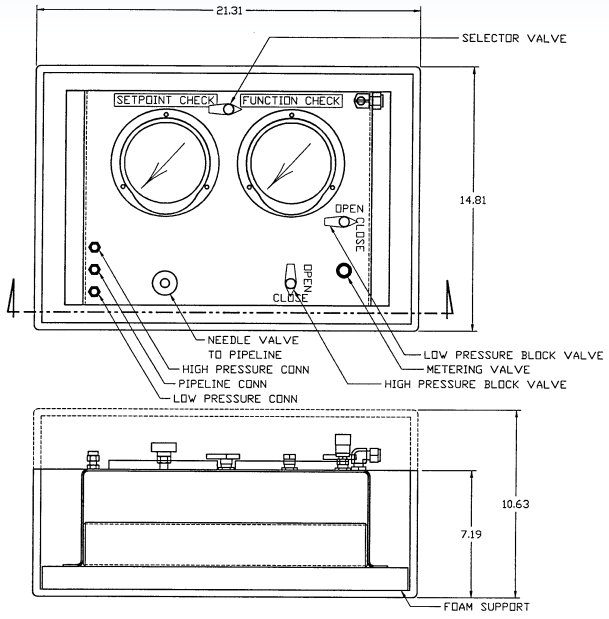
Available Options

- Back-up low pressure detection
- Time delay control system, adjustable 1 to 4 minutes typical
- Sour gas pipeline application
- Weatherproof enclosure
- Prefilter on pipeline connection
- Alarm to control room pressure switch
- Higher rate of drop ranges
- Manual reset, lockout or override

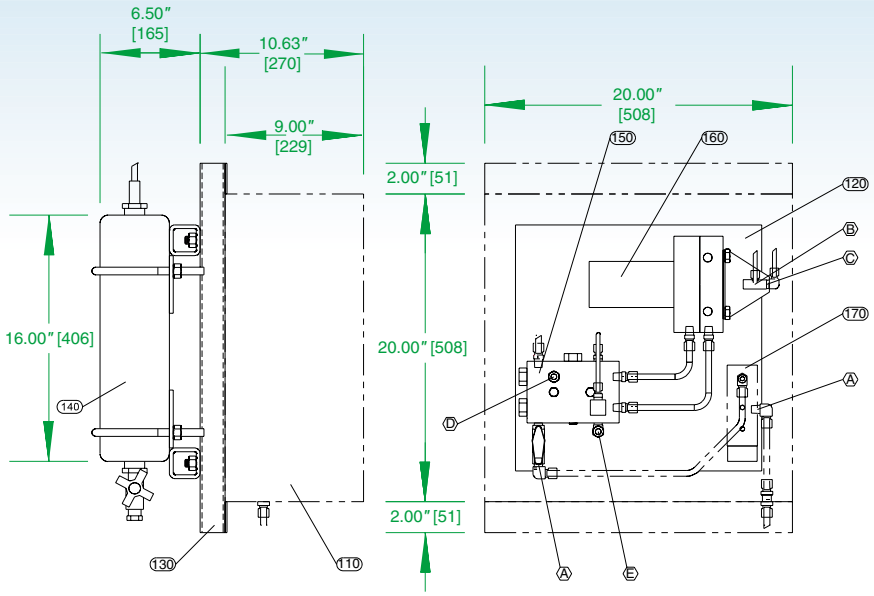
DeltaMatic Type Number	Nominal RoD Range (psi/min)
400416	5 to 15
200416	10 to 30
100416	20 to 60
050416	40 to 120

Table A

Calibration Kit



Typical Assembly/Dimensional



ITEM	DESCRIPTION
110	ENCLOSURE (OPTIONAL)
120	SUBPLATE
130	MOUNTING BRACKET (TYPICAL)
140	RATE TANK
150	MANIFOLD ASSEMBLY
160	J-1 PILOT
170	PREFILTER (RECOMMENDED)

Ⓐ PIPELINE CONNECTION: 1/4 NPT

Ⓑ SIGNAL (COM) CONNECTION
150 PSI MAX: 1/4 NPT

Ⓒ SUPPLY (N.O.) CONNECTION
150 PSI MAX: 1/4 NPT

Ⓓ HP CALIBRATION PORT: 1/4 TUBE

Ⓔ LP CALIBRATION PORT: 1/4 TUBE

WEIGHT: 60 LB [27.3 KG]
(EXCLUDING ITEMS 110 AND 130)

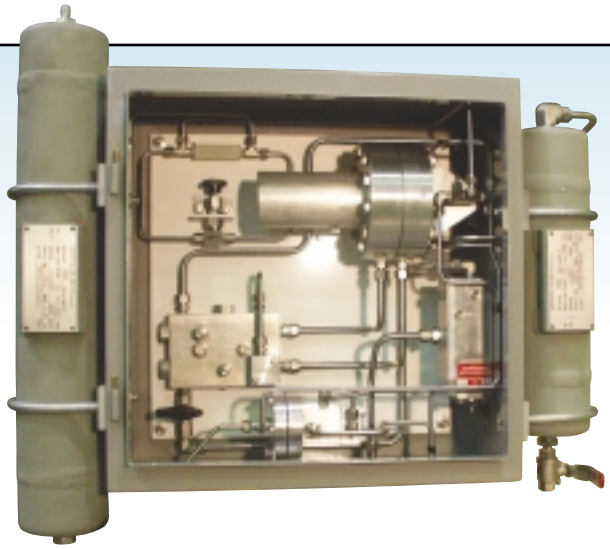
Ordering Information

Operating Environment

- Line Pressure range
- Max. and min. temperatures
- Humidity, rain and snowfall
- Service media
- Mounting; backplate or enclosure

Control specifications

- Rate of pressure drop range and setpoint
- Pneumatic supply pressure (maximum)
- Output signal: vent or apply to trip
- Additional controls, options
- Special requirements



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