6335

2-Wire HART® Transmitter

No. 6335V109-IN
From ser. no. 100924000

PC

SG

US

ATEX

FM

TECEx

Signals the best

PR electronics A/S offers a wide range of analogue and digital signal conditioning modules for industrial automation. The product range includes Isolators, Displays, Ex Interfaces, Temperature Transmitters, and Universal Modules. You can trust our products in the most extreme environments with electrical noise, vibrations and temperature fluctuations, and all products comply with the most exacting international standards. »Signals the Best« is the epitome of our philosophy – and your guarantee for quality.

PR electronics A/S offre une large gamme de produits pour le traitement des signaux analogiques et numériques dans tous les domaines industriels. La gamme de produits s’étend des transmetteurs de température aux afficheurs, des isolateurs aux interfaces SI, jusqu’aux modules universels. Vous pouvez compter sur nos produits même dans les conditions d’utilisation sévères, p.ex. bruit électrique, vibrations et fluctuations de température. Tous nos produits sont conformes aux normes internationales les plus strictes. Notre devise »SIGNALS the BEST« c’est notre ligne de conduite - et pour vous l’assurance de la meilleure qualité.

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EC DECLARATION OF CONFORMITY

As manufacturer

PR electronics A/S
Lerbakken 10
DK-8410 Rønde

hereby declares that the following product:

Type: 6335
Name: 2-wire HART® transmitter

is in conformity with the following directives and standards:

The EMC Directive 2004/108/EC and later amendments
EN 61326-1 : 2006

For specification of the acceptable EMC performance level, refer to the electrical specifications for the module.

The ATEX Directive 94/9/EC and later amendments
EN 60079-0 : 2006, EN 60079-11 : 2007,
ATEX certificate: KEMA 10ATEX0006 X (6335A)
ATEX certificate: KEMA 09ATEX0148 (6335D)

Notified body

KEMA Quality B.V. (0344)
Utrechtseweg 310, 6812 AR Arnhem
P.O. Box 5185, 6802 ED Arnhem
The Netherlands

Rønde, 22 March 2010
Kim Rasmussen
Manufacturer's signature
2-WIRE HART® TRANSMITTER
PRETRANS 6335

- RTD, TC, Ohm, or mV input
- Extremely high measurement accuracy
- HART® communication
- Galvanic isolation
- 1- or 2-channel version

Application
- Linearised temperature measurement with Pt100...Pt1000, Ni100...Ni1000, TC or sensor.
- Difference or average temperature measurement of 2 resistance or TC sensors.
- Conversion of linear resistance variation to a standard analogue current signal, for instance from valves or Ohmic level sensors.
- Amplification of a bipolar mV signal to a standard 4...20 mA current signal.
- Connection of up to 15 channels to a digital 2-wire signal with HART® communication.

Technical characteristics
- Within a few seconds the user can program PR6335 to measure temperatures within all ranges defined by the norms.
- The RTD and resistance inputs have cable compensation for 2-, 3- and 4-wire connection.
- The 6335 has been designed according to strict safety requirements and is thus suitable for application in SIL 2 installations.
- A limit can be programmed on the output signal.
- Continuous check of vital stored data for safety reasons.
- Sensor error detection according to the guidelines in NAMUR NE 89.

Mounting / installation
- Mounted vertically or horizontally on a DIN rail. As the modules can be mounted without any distance between neighbouring units, up to 84 channels can be mounted per metre.
- NB: As Ex barrier for 6335D we recommend 5106B.
APPLICATIONS

RTD to 4...20 mA

2-wire installation in control room

TC to 4...20 mA

2-wire installation in control room

Resistance to 4...20 mA

2-wire installation in control room

mV to 4...20 mA

2-wire installation in control room

Difference or average RTD, TC or mV

2-wire installation in control room

RTD, TC, or mV

2-wire installation in control room

Differenz oder Mittel

WTH, TE oder mV

2-wire installation in control room

RTD to 4...20 mA

2-trådsinstallation i kontrolrum

mV to 4...20 mA

2-trådsinstallation i kontrolrum

mV til 4...20 mA

Differens eller middel

RTD, TC eller mV

2-trådsinstallation i kontrolrum

RTD til 4...20 mA

2-trådsinstallation i kontrolrum
Order: 6335

<table>
<thead>
<tr>
<th>Type</th>
<th>Version</th>
<th>Galvani isolation</th>
<th>Channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>6335</td>
<td>Standard: A</td>
<td>1500 VAC : 2</td>
<td>Single : A</td>
</tr>
<tr>
<td></td>
<td>CSA, FM, ATEX &amp; IECEx : D</td>
<td></td>
<td>Double : B</td>
</tr>
</tbody>
</table>

*NB! Please remember to order CJC connectors type 5910/5910Ex (channel 1) and 5913/5913Ex (channel 2) for TC inputs with an internal CJC.

**Electrical specifications**

**Specifications range:**

-40°C to +60°C

**Common specifications:**

Supply voltage, DC
- Standard: 8.0…35 VDC
- CSA, FM, ATEX & IECEx: 8.0…30 VDC

Isolation voltage, test / operation: 1.5 kVAC / 50 VAC

Isolation voltage, channel 1 / channel 2:
- Standard: 3.75 kVAC
- CSA, FM, ATEX & IECEx: 1500 VAC

Warm-up time: 30 s

Communications interface: Loop Link and HART®

Signal / noise ratio: Min. 60 dB

Response time (programmable): 1…60 s

EEprom error check: < 10 s

Signal dynamics, input: 22 bit

Signal dynamics, output: 16 bit

Calibration temperature: 20…28°C

Accuracy, the greater of general and basic values:

<table>
<thead>
<tr>
<th>General values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input type</td>
</tr>
<tr>
<td>All</td>
</tr>
</tbody>
</table>
### Basic values

<table>
<thead>
<tr>
<th>Input type</th>
<th>Basic accuracy</th>
<th>Temperature coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pt100 and Pt1000</td>
<td>$\leq \pm 0.1{^\circ}C$</td>
<td>$\leq \pm 0.005{^\circ}C / {^\circ}C$</td>
</tr>
<tr>
<td>Ni100</td>
<td>$\leq \pm 0.2{^\circ}C$</td>
<td>$\leq \pm 0.005{^\circ}C / {^\circ}C$</td>
</tr>
<tr>
<td>Lin. R</td>
<td>$\leq \pm 0.1 \Omega$</td>
<td>$\leq 5 \mu \Omega / {^\circ}C$</td>
</tr>
<tr>
<td>Volt</td>
<td>$\leq 10 \mu V$</td>
<td>$\leq 0.5 \mu V / {^\circ}C$</td>
</tr>
<tr>
<td>TC type:</td>
<td>$\leq \pm 0.5{^\circ}C$</td>
<td>$\leq \pm 0.025{^\circ}C / {^\circ}C$</td>
</tr>
<tr>
<td>B, R, S, W3, W5</td>
<td>$\leq \pm 1{^\circ}C$</td>
<td>$\leq \pm 0.1{^\circ}C / {^\circ}C$</td>
</tr>
</tbody>
</table>

EMC immunity influence ........................................ $\leq \pm 0.1{^\circ}$ of span
Extended EMC immunity:
NAMUR NE 21, A criterion, burst ................................. $\leq \pm 1{^\circ}$ of span

Effect of supply voltage variation ......................... $\leq 0.005{^\circ}$ of span / VDC
Max. wire size ................................................. $1 \times 1.5 \text{ mm}^2$ stranded wire
Humidity .................................................. $\leq 95{^\circ}$ RH (non-cond.)
Dimensions .................................................. 109 x 23.5 x 104 mm
Protection degree ........................................... IP20
Weigh (1 / 2 channels) .................................... 145 / 185 g

### Electrical specifications, inputs:
Max. offset ................................................. 50% of selected numerical max. value

### RTD and linear resistance input:

<table>
<thead>
<tr>
<th>RTD type</th>
<th>Min. value</th>
<th>Max. value</th>
<th>Min. span</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pt100</td>
<td>-200°C</td>
<td>+850°C</td>
<td>10°C</td>
<td>IEC 60751</td>
</tr>
<tr>
<td>Ni100</td>
<td>-60°C</td>
<td>+250°C</td>
<td>10°C</td>
<td>DIN 43760</td>
</tr>
<tr>
<td>Lin. R</td>
<td>0 Ω</td>
<td>7000 Ω</td>
<td>10 Ω</td>
<td>-----</td>
</tr>
</tbody>
</table>

Cable resistance per wire (max.) ....................... 5 Ω
Sensor current .............................................. Nom. 0.2 mA
Effect of sensor cable resistance
(3- / 4-wire) ............................................... $\leq 0.002 \Omega / \Omega$
Sensor error detection ...................................... Yes
Short circuit detection ..................................... If 0% > 30 Ω
### TC inputs:

<table>
<thead>
<tr>
<th>Type</th>
<th>Min. temperature</th>
<th>Max. temperature</th>
<th>Min. span</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>+400°C</td>
<td>+1820°C</td>
<td>100°C</td>
<td>IEC584</td>
</tr>
<tr>
<td>E</td>
<td>-100°C</td>
<td>+1000°C</td>
<td>50°C</td>
<td>IEC584</td>
</tr>
<tr>
<td>J</td>
<td>-100°C</td>
<td>+1200°C</td>
<td>50°C</td>
<td>IEC584</td>
</tr>
<tr>
<td>K</td>
<td>-180°C</td>
<td>+1372°C</td>
<td>50°C</td>
<td>IEC584</td>
</tr>
<tr>
<td>L</td>
<td>-100°C</td>
<td>+900°C</td>
<td>50°C</td>
<td>DIN 43710</td>
</tr>
<tr>
<td>N</td>
<td>-180°C</td>
<td>+1300°C</td>
<td>50°C</td>
<td>IEC584</td>
</tr>
<tr>
<td>R</td>
<td>-50°C</td>
<td>+1760°C</td>
<td>100°C</td>
<td>IEC584</td>
</tr>
<tr>
<td>S</td>
<td>-50°C</td>
<td>+1760°C</td>
<td>100°C</td>
<td>IEC584</td>
</tr>
<tr>
<td>T</td>
<td>-200°C</td>
<td>+400°C</td>
<td>50°C</td>
<td>DIN 43710</td>
</tr>
<tr>
<td>U</td>
<td>-200°C</td>
<td>+600°C</td>
<td>50°C</td>
<td>DIN 43710</td>
</tr>
<tr>
<td>W3</td>
<td>0°C</td>
<td>+2300°C</td>
<td>100°C</td>
<td>ASTM E988-90</td>
</tr>
<tr>
<td>W5</td>
<td>0°C</td>
<td>+2300°C</td>
<td>100°C</td>
<td>ASTM E988-90</td>
</tr>
</tbody>
</table>

Cold junction compensation ......................................................................................................................... < ±1.0°C
External CJC with Ni100 or Pt100 ................................................................................................................. -40 ≤ T_{amb.} ≤ 135°C
Sensor error detection ................................................................................................................................. Yes
Sensor error current:
  When detecting................................................................. Nom. 33 μA
  Else..................................................................................... 0 μA
Short circuit detection................................................................................................................................. If 0% > 5 mV

### Voltage inputs:
Measurement range ................................................................................................................................. -800...+800 mV
Min. span.................................................................................................................................................... 2.5 mV
Input resistance............................................................................................................................................ 10 MΩ

### Current output:
Signal range ................................................................................................................................................. 4...20 mA
Min. signal range ..................................................................................................................................... 16 mA
Updating time.............................................................................................................................................. 440 ms (660 ms for diff.)

Fixed output signal..................................................................................................................................... Between 4 and 20 mA
Output signal at EEPROM error .................................................................................................................. ≤ 3.5 mA
Load resistance......................................................................................................................................... ≤ (V_{supply} - 8) / 0.023 [Ω]
Load stability.............................................................................................................................................. ≤ ±0.01% of span / 100 Ω

### Sensor error detection:
Programmable............................................................................................................................................... 3.5...23 mA
NAMUR NE43 Upscale ................................................................................................................................. 23 mA
NAMUR NE43 Downscale............................................................................................................................. 3.5 mA

Of span = Of the presently selected range
Ex approval - 6335A:
KEMA 10ATEX0006 X........................................... II 3 G Ex nA [nL] IIC T4...T6 or
II 3 G Ex nL IIC T4...T6 or
II 3 G Ex nA [ic] IIC T4...T6 or
II 3 G Ex ic IIC T4...T6

ATEX Installation Drawing No. ........... 6335QA02

Ex / I.S. approvals - 6335D:
ATEX KEMA 09ATEX0148 ............................ Ex II 1 G Ex ia IIC T6...T5
Max. ambient temperature for T6 ............ 40°C
Max. ambient temperature for T5 ............ 60°C
ATEX, applicable in zone ....................... 0, 1 or 2
ATEX Installation Drawing No. ........... 6335QA01
IECEEx KEM 10.0084 ................................. Ex ia IIC T5 Ga
IECEEx Installation Drawing No. ........... 6335QI01
FM, applicable in .................................. IS, Class I, Div. 1, Group A, B, C, D
FM Installation Drawing No................. 6335QF01
CSA, applicable in .................................. IS, Class I, Div. 1, Group A, B, C, D,
Ex ia IIC
CSA Installation Drawing No. ........... 6335QC02

GOST R approval:
VNIIM & VNIIFTRI, Cert. no. ................. See www.prelectronics.com

Observed authority requirements: Standard:
EMC 2004/108/EC ............................................. EN 61326-1
ATEX 94/9/EC .................................................. EN 60079-0, EN 60079-11,
EN 60079-15, EN 60079-26
IECEEx ......................................................... IEC 60079-0, -11, 26
FM ................................................................. 3600, 3611, 3610
CSA, CAN / CSA ............................................. C22.2 No. 157, E60079-11, UL 913
CONNECTIONS

Inputs:
PROGRAMMING

PRetrans 6335 can be configured in the following 3 ways:

1. With PR electronics A/S’ communications interface Loop Link and PReset PC configuration software.
2. With a HART® modem and PReset PC configuration software.
3. With a HART® communicator with PR electronics A/S’ DDL driver.

1: Loop Link

For programming please refer to the drawing below and the help functions in PReset.

When communicating with non-installed modules, connectors 11, 12, 13, 14 (channel 1) and 21, 22, 23, 24 (channel 2) can be dismantled in the safe area to connect the terminals of the communications interface to the pins.

Loop Link is not approved for communication with modules installed in hazardous (Ex) area.

Order: Loop Link
2: HART® modem
For programming please refer to the drawing below and the help functions in PReset.

Order: HART® modem 276D

3: HART® communicator
For programming please refer to the drawing below. To get access to product-specific commands, the HART® communicator must be loaded with the PR electronics A/S DDL driver. This can be ordered either at the HART® Communication Foundation or PR electronics A/S.

Order: HART® communicator 275D
CONNECTION OF TRANSMITTERS IN MULTIDROP MODE

• The HART® communicator or a PC modem can be connected across AB or BC.

• The outputs of max. 15 transmitters can be connected in parallel for a digital HART® communication on 2-wires.

• Before it is connected, each transmitter must be configured with a unique number from 1 to 15. If 2 transmitters are configured with the same number, both will be excluded. The transmitters must be programmed for multidrop mode (with a fixed output signal of 4 mA). Maximum current in the loop is therefore 60 mA.

• The communication is either by means of a HART® communicator or a HART® modem.

• The PReset PC configuration software can configure the individual transmitter for multidrop mode and provide it with a unique polling address.
APPENDIX

ATEX INSTALLATION DRAWING - 6335A

ATEX INSTALLATION DRAWING - 6335D

IECEX INSTALLATION DRAWING - 6335D

FM INSTALLATION DRAWING NO. 6335QF01

CSA INSTALLATION DRAWING NO. 6335QC02
ATEX Installation drawing

For safe installation of 6335A the following must be observed. The module shall only be installed by qualified personnel who are familiar with the national and international laws, directives and standards that apply to this area.
Year of manufacture can be taken from the first two digits in the serial number.

ATEX Certificate KEMA 10ATEX 0006X

Marking

II 3 G Ex nA [nL] IIC T6..T5
II 3 G Ex nL IIC T6..T5
II 3 G Ex nA [ic] IIC T6..T5
II 3 G Ex ic IIC T6..T5


Hazardous Area Zone 2

Terminal:
11-13 / 21-23
Ex nA

Terminal:
41,42,43,44 / 51,52,53,54
Ex nA [nL]

Uo: 9.6 VDC
Io: 28 mA
Po: 67 mW
Lo: 35 mH
Co: 3.5 μF

Ui = 35 VDC
Li = 10 μH
Ci = 2.0 nF

Special conditions for safe use:

For use in a potentially explosive atmosphere of flammable gasses, vapours or mists, the transmitter shall be mounted in an enclosure providing a degree of protection of at least IP54 in accordance to EN60529.
ATEX Installation drawing

For safe installation of 6335D the following must be observed. The module shall only be installed by qualified personnel who are familiar with the national and international laws, directives and standards that apply to this area.

Year of manufacture can be taken from the first two digits in the serial number.

- **ATEX Certificate**: KEMA 09ATEX 0148
- **Marking**: II 1 G Ex ia IIC T6...T5

### Hazardous area

- **Zone**: 0, 1, 2
- **T5**: -40 ≤ Ta ≤ 60°C
- **T6**: -40 ≤ Ta ≤ 40°C

### Terminal:

- **41,42,43,44**
  - **Uo**: 9.6 V DC
  - **Io**: 28 mA
  - **Po**: 67 mW
  - **Lo**: 35 mH
  - **Co**: 3.5 μF

- **51,52,53,54**
  - **Uo**: 9.6 V DC
  - **Io**: 28 mA
  - **Po**: 67 mW
  - **Lo**: 35 mH
  - **Co**: 3.5 μF

### Terminal:

- **11,12,13,14 and 21,22,23,24**
  - **Ui**: 30 V DC
  - **Ii**: 120 mA
  - **Pi**: 0.84 W
  - **Li**: 10 μH
  - **Ci**: 2.0 nF

### Installation notes

The Instructions provided with the equipment shall be followed in detail to assure safe operation.
IECEx Installation drawing

For safe installation of 6335D or 6336D the following must be observed. The module shall only be installed by qualified personnel who are familiar with the national and international laws, directives and standards that apply to this area.

Year of manufacture can be taken from the first two digits in the serial number.

IECEx Certificate: IECEx KEM.10.0084
Marking: Ex ia IIC T5 Ga

Installation notes
The Instructions provided with the equipment shall be followed in detail to assure safe operation.
**Installation Drawing 6335QF01**

**Model 6335C, 6335D**

**Hazardous (Classified) Location**
- Class I, Division 1, Groups A, B, C, D
- Class II Division 1 Groups E, F, G
- Class I, Zone 0, IIC

Ambient temperature limits
T6: -40 to + 60 deg. Celsius

Terminal 41, 42, 43, 44
- Vt or Uo: 9.6 V
- It or Io: 28 mA
- Pt or Po: 67.2 mW
- Ca or Co: 3.5 uF
- La or Lo: 35 mH

Terminal 51, 52, 53, 54
- Vt or Uo: 9.6 V
- It or Io: 28 mA
- Pt or Po: 67.2 mW
- Ca or Co: 3.5 uF
- La or Lo: 35 mH

Terminal 21, 24
- Vmax or Ui: 30 V
- Imax or Ii: 120 mA
- Pmax or Pi: 0.84 W
- Ci: 1 nF
- Li: 10 uH

**Non Hazardous Location**

Terminal 11, 14
- Vmax or Ui: 30 V
- Imax or Ii: 120 mA
- Pmax or Pi: 0.84 W
- Ci: 1 nF
- Li: 10 uH

**Installation notes.**

The Transmitter must be installed in a suitable enclosure to meet installation codes stipulated in The National Electrical Code (ANSI-NFPA 70).

When installed in Class II locations the Transmitter shall be installed in an enclosure with a specified ingress protections of IP6X according to IEC60529 and Dust-tight conduit seals must be used.

Equipment that is FM-approved for intrinsic safety may be connected to barriers based on the ENTITY CONCEPT. This concept permits interconnection of approved transmitters, meters and other devices in combinations which have not been specifically examined by FM, provided that the agency’s criteria are met. The combination is then intrinsically safe, if the entity concept is acceptable to the authority having jurisdiction over the installation.

The entity concept criteria are as follows:

The intrinsically safe devices, other than barriers, must not be a source of power.

The maximum voltage Ui(V\text{MAX}) and current li(I\text{MAX}), and maximum power Pi(P\text{MAX}), which the device can receive and remain intrinsically safe, must be equal to or
greater than the voltage ($U_o$ or $V_{oc}$ or $V_t$) and current ($I_o$ or $I_{sc}$ or $I_t$) and the power $P_o$ which can be delivered by the barrier.

The sum of the maximum unprotected capacitance ($C_i$) for each intrinsically device and the interconnecting wiring must be less than the capacitance ($C_o$) which can be safely connected to the barrier.

The sum of the maximum unprotected inductance ($L_i$) for each intrinsically device and the interconnecting wiring must be less than the inductance ($L_o$) which can be safely connected to the barrier.

The entity parameters $U_o$, $V_{oc}$ or $V_t$ and $I_o$, $I_{sc}$ or $I_t$, and $C_o$ and $L_o$ for barriers are provided by the barrier manufacturer.
 CSA Installation Drawing 6335QC02.

6335D transmitters are approved as intrinsically safe in Zone 0 Group IIC or Class I, Division 1, Group A, B, C, D when installed according to Installation Drawing.

1. Connections with separate power supply and receiver.
Output: Standard 4 - 20mA loop

Intrinsically safe Barrier Parameters.

- **Uo(Voc)** =< 30V
- **Io(Isc)** =< 120mA
- **Po** =< 0.84 W
- **Co(Ca)>> Sum(Ci+Cable)**
- **Lo(La)>> Sum(Li+Lcable)**

Ambient temperature limits
- T6:-40 to + 60 deg. Celcius
- Terminal: 11-14 and 21-24
- U(Vmax) = 30V
- li(Imax) = 120mA
- Pi = 0.84W
- Ci = 1 nF
- Li = 10 uH

Terminal: 41-44 and 51-54
- Uo(Voc) = 9.6 V
- Io(Isc) = 28 mA
- Po = 67.2 mW
- Co(Ca) = 3.5 uF
- Lo(La) = 35 mH

Warning:
Substitution of components may impair intrinsic safety.
Channel 1 and Channel 2 are separate channels and therefore separate shielded cables shall be used for each channel.

The 6335 must be installed in a suitable enclosure to meet installation codes stipulated in the Canadian Electrical Code (CEC).
2. Connection with power supply and barrier built into receiver.

Output: Standard 4 - 20mA loop

Warning: Substitution of components may impair intrinsic safety.

Channel 1 and Channel 2 are separate channels and therefore separate shielded cables shall be used for each channel.

The 6335 must be installed in a suitable enclosure to meet installation codes stipulated in the Canadian Electrical Code (CEC).
Displays Programmable displays with a wide selection of inputs and outputs for display of temperature, volume and weight, etc. Feature linearisation, scaling, and difference measurement functions for programming via PRest software.

Ex interfaces Interfaces for analogue and digital signals as well as HART® signals between sensors / I/P converters / frequency signals and control systems in Ex zone 0, 1 & 2 and for some modules in zone 20, 21 & 22.

Isolation Galvanic isolators for analogue and digital signals as well as HART® signals. A wide product range with both loop-powered and universal isolators featuring linearisation, inversion, and scaling of output signals.

Temperature A wide selection of transmitters for DIN form B mounting and DIN rail modules with analogue and digital bus communication ranging from application-specific to universal transmitters.

Universal PC or front programmable modules with universal options for input, output and supply. This range offers a number of advanced features such as process calibration, linearisation and auto-diagnosis.